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ORIGINAL COMMUNICATIONS.

I.—*On the Arrangement of Gardens and Pleasure-Grounds in the Elizabethan Age.*

(Communicated by the Vice-Secretary.)

Before the reign of Elizabeth it would not seem that the laying out of grounds, or even horticulture itself, in the strict sense of the word, had been made the subject of any treatise. That records of the opinions and habits of our ancestors on these matters exist in old MSS., although not reduced therein to any regular system, there is little reason to doubt; and, as regards horticulture, it would assuredly repay any person who may have the leisure if he should ascertain successfully what were the indigenous plants, and especially vegetables, of this country, tracing carefully the introduction of others into general use. Such information must exist in the British Museum and in other libraries in which the older MSS. are preserved. It would doubtless be a laborious work. Hundreds of pages must be searched with comparatively few though valuable results; yet the whole result would be as instructive as gratifying.

Failing this general inquiry, extending from the earliest period on which information can be brought to bear down to our own time, the first period in which information is yielded to us from printed works is in its own way full of interest. Every one has a pretty correct notion of a mansion of the Elizabethan era—its peculiarities as to external style and internal arrangement—and every one is equally aware that in the last few years a considerable revival of this architectural style has taken place. It was not unnatural, however, that they who have been roused into strong admiration of this style—and if it be admired at all the admiration felt is usually enthusiastic—should imagine the revival incomplete unless the mansion were surrounded by gardens and grounds precisely in the taste of the same date. It is not absolutely self-evident that this should be a necessary consequence of reviving the mansion any more than that the same consequence should obtain if we should erect a mansion of the Grecian, or Roman, or Saxon, or Gothic, or any other style. So far from it, such a principle must involve a great degree of inconvenience as well as absurdity. The truth, however, is that very few are well informed on the subject; and I think that nothing would go further to open the eyes of such ultra-enthusiasts than to resuscitate a complete model of the grounds and garden attached

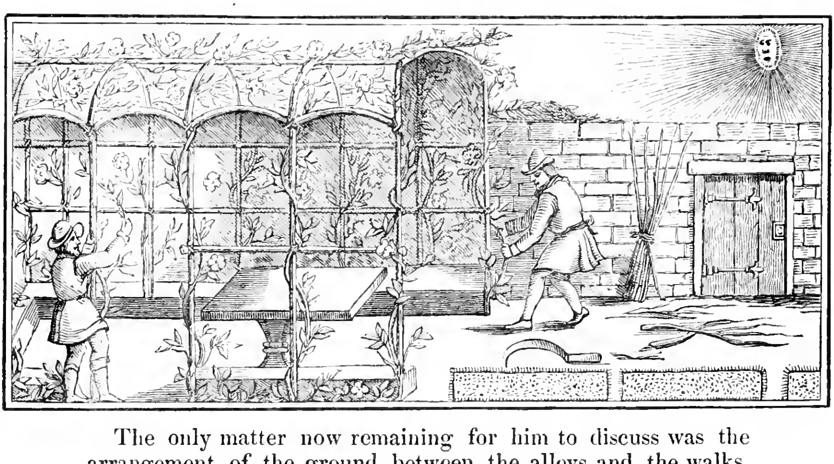
to a mansion of the period in question. This cannot very well be done, and indeed would be scarcely worth the expense. For we have access to books which avowedly describe the prevailing fashions in gardening, with the then latest improvements, and do so very accurately.

The first of any importance was written by Didymus Mountain, and the first edition came out towards the close of the sixteenth century. It is dedicated by permission to "the Right Honourable and his singular good Lorde Sir William Cecille, Knight of the Most Noble Order of the Garter, Baron of Burghley, Lord High Treasurer of England, &c." Nothing could demonstrate the utter want of originality at that time more completely than this work. Prefixed to it, and ostentatiously, is a list of twenty-eight authors on which it is founded. It commences with Pliny, Cicero, and Columella, and ends with Galen; and the directions given in the body of the work as to laying out the garden are obviously only an embodiment of the fashionable style then existing, for the benefit of his uninitiated readers. However unoriginal, then, the whole compilation may be, it is in the same proportion valuable as a record of facts, and its value is not diminished by its illustrative woodcuts, which were doubtless regarded at that day as beautiful. He first sketches certain specimens of ancient gardening among the Romans, and then says, "But to be brief, and leaving further to report of antiquity, I think it high time to declare the effects and commodity of this work taken in hand, and first to entreate of the care, helps, and secrets to be learned and followed in the garden-ground, all which in a pleasant manner shall after be uttered in distinct chapters, to the furtherance and commodity of many gardeners, and all such having pleasure therein." Of the author's "pleasant manner," which he proclaims so complacently, the less said the better; and while the substance of the book might certainly be for "the commodity" of such gardeners as were before in a state of utter ignorance, I confess myself unable to see what "furtherance" or improvement could be gained by those who were even tolerably informed or possessed any reflecting faculties themselves. The author starts naturally enough with the principle on which the whole garden-plot should be laid down, and a most Lilliputian grasp of mind and imagination it shows. There is no wide yet varied expanse of surface; no undulation is spoken of; no changing views created artificially yet natural in effect; no lake with its calm sheet of water, its broken shores, and its overhanging trees and bordering shrubs and flowers; no winding paths, or purling streams, or beautiful water-falls; no well-placed groups of trees, and not a hint of a noble avenue. The direction is as low-idea'd as the principle itself is bald.

"As to the well standing of a garden, it behoveth the aptest and most laudable placing of a garden-plot shall be, if the *plain* ground lying somewhat aslope shall have a course of spring water running through by several parts. But this course of water running through the garden *may in no wise be big*." I do not think that I have wrongly described the author's conception as Lilliputian. It is clear that he did not contemplate the devoting of a large space of ground to this purpose, from his caution that the streamlet must be narrow; or, on the other hand, if the whole space were intended to be really large, the narrow rills of water must have had an effect inconceivably ludicrous. Even so far, largeness of conception is out of the question. Nothing is designed or imagined worthy of being an accompaniment to a noble and magnificent mansion. With the park beyond the garden I have nothing to do: it is on the space between the mansion and the park that the author operates, whether tastefully or not there can be little or no difference of opinion.

The first feature of any importance which strikes the attention is contained in his twelfth chapter, entitled thus:—"The framing of sundry herbers delectable in a garden, with the walks and alleys artly devised in the same." And he thus describes what he evidently views as one of the principal ornaments. "The herber (arbour) in a garden may be framed with juniper-poles or the willow, either to stretch or be bound together with osiers after a square form, or in arch-manner united, that the branches of the vine, melon, or cucumber, running and spreading all over, might so shadow and keep both the heat and sun from the walkers and sitters therein. The herbers erected and framed in *most* gardens are to their much refreshing comfort and delight." This idea alone relishes exceedingly of the taste adapted to the comfort of modern tea-gardens—specimens of which have long abounded in the suburbs of London and along the shores of the Thames. But whether we can term that taste refined or exalted which would prescribe this as one of the chief beauties for the external adornment of a stately mansion I cannot and dare not say. But we can approximate to a clearer notion of the actual appearance of these herbers by contemplating his description of the square-formed and arched herbers respectively. For the square-formed he recommends plants and flowers of a fragrant savour, such as rosemary, jasmine, and the rose; for the arched, jasmine-tree, musk-rose, damask-rose, privet-tree, "vines also as well." I honestly confess myself rather puzzled to account for the careful classification of plants for the differently shaped herbers. I do not know why the same plants should not have been equally well designed for both—the flowers equally fragrant, and grapes equally luscious. Probably, however, the arched herber was

meant to adorn the grounds of the more aristocratic or the more wealthy owner. These herbers, of whichever shape, stood at the side of alleys, which he mentions in the title to this chapter. And this feature of his garden views and garden delights is thus simply described:—"They are to be even trodden out, and levelled by a line, as either three or four feet broad, and are to be cleanly sifted over with sand, to the end that showers of rain falling may not offend the walkers (at that instant) in them, by the earth cleaving or clogging to their feet." Very plain all this—very straightforward—but surely not very exquisite in ideal or real beauty. But the author falls back upon the plea of utility. He declares the use of alleys to be that the owner may be able "so to view the prosperity of his herbes and flowers." The truth is manifest—that what would be regarded in these days not as a beautiful ornament but simply as a convenience, and that, too, to a house of only moderate pretensions, was magnified into a feature of the scene which was not only indispensable but worthy of all admiration. But the alleys would be incomplete without the walks. And his language is worthy of observation, as showing how completely the *formal* reigned in every part of the plan. They are strictly enjoined to be "strait." "These strait walks, *the wealthy* made like galleries, being all open towards the garden, and covered with the vine spreading all over, or some other trees which more pleased them. Thus briefly have I touched upon the benefit of walks and alleys in any garden-ground, which the gardener of his own experience may artly tread out by a line and sift over with sand for the causes above uttered."



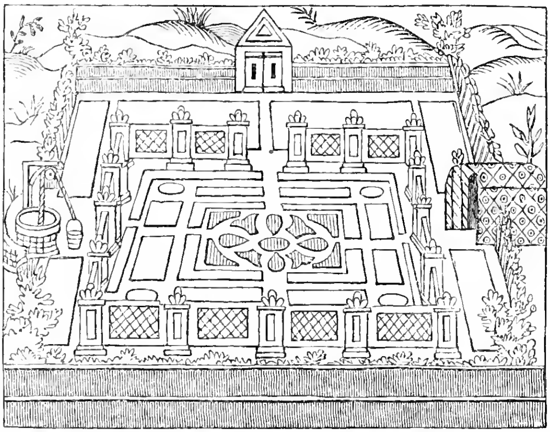
The only matter now remaining for him to discuss was the arrangement of the ground between the alleys and the walks,

and then the picture would be complete. This he fills up with quarters and beds. "Quarters" he desires to be well turned in, and fatted with good manure; and the "beds" he thus describes—they are to be trodden out *narrow*, and of a length as twelve feet long and six feet broad. In moist ground the edges of the beds are to be two feet high; in dry ground the height of one foot is declared sufficient; and there are to be good gutters around the beds. The above woodcut, taken from his work, shows a portion of a garden, containing a bed, a herber, an alley, a walk, two creatures designed to be men, and one of the most gorgeous sunsets ever beheld.

The general laying out of the ground surface is now pretty clear. But formal as the whole arrangement is, and equally formal the shapes of the herbers, the alleys, and the walks, we should form a very inadequate idea of the whole effect in appearance, or of the then favourite subjects for horticulture, if we did not give his instructions as to the seeds of vegetables, "tender herbes and pleasant flowers," with which these beds were to be stocked. In the end of harvest, in September and October, for winter, are to be sown endive, onions, garlicke, scalions, the great garlicke, young leek-heads, coleworts, mustard-seed, and such like; in harvest and spring time, coleworts, manew (so I make out the word), artichoke, endive, lettuce, dyll, rocket, coliander, parsley, fennell, radish, parsnip, carrot, and others. This is the substance of the directions given in one chapter. In the next he thus speaks of "tender herbes and pleasant flowers." I go on at once to this part, for the intervening directions as to the comparative ages of the seeds to be used scarcely belong to this division of the subject. His list, then, of these herbs and flowers is very curious—curious on account of their being so intermingled as to give no idea of the taste shown in their disposition throughout the garden. It runs thus:—"Marjoram, saverie, herbe fluelline, buglosse, the blessed thistel, the herbe angelica, valerian, baulme, annis, dil, fennel, digany, rue or herbe of grace, sperage, aracke, spynache, brites, endyve, borage, rocket, taragone, parslie, sorrall, strawberrie, lettuce, artichoke, marigold of all sorts: rosecampion red and white, flower amorose, flower petilins, columbine white and blue, sweet Johns, pincke, heart's-ease, peonie, red lilie, lavender gentle, bachelors' button, gill-flower of all kinds, and carnation."

Now there are several matters worthy of observation in this portion of the work. An explanation of some of the words used to designate vegetables or flowers would employ the leisure of some of our readers well. It would be curious, again, to ascertain which of our principal modern vegetables are absent from this list; the potato necessarily being one. As to the flowers,

seeing the progress which has been made in their cultivation, the immense addition made to the varieties of those previously existing, and the great number of new sorts introduced, it would be vain to institute a comparison between the choicest flower garden of that date and one of our own time. But there is one point on which the author leaves us in the dark; I mean the respective beds or situations in which the vegetables and herbs and flowers are to be placed. It is true that he has given a general plan in a woodcut, of which I subjoin a copy, and which it will amuse the readers of this Journal to decipher and explain.



There is no need, however, for us to assume this to be the only plan to be carried out. The general principles of the system are quite enough for our purpose, and for bringing before the reader's imagination the prevailing fashion of those days. Whether the vegetables and herbs or the flowers were placed nearest to the house it is difficult to decide, and, indeed, is of very little consequence; for beyond having pretty flowers in certain seasons, there seems nothing to redeem the offensive ugliness of the whole design. The moderate space of ground assigned to the garden and pleasure portion altogether, the formal herbers, the rigidly straight and carefully sanded alleys, the equally straight and formal walks, the oblong and peculiarly formal beds, are features quite sufficiently commanding in their repulsiveness to prevent any arrangement of the most beautiful flowers within those formal spaces from yielding delight to the eye. But each of those beds in which flowers were cultivated

was made the scene of an arrangement as unnatural as the ground-plan of the whole garden itself. This system long prevailed; so long that Milton could not resist giving a condemnatory allusion to it in his description of Paradise. He speaks of—

> " Flow'rs worthy of Paradise, *which not nice art*
> *In beds and curious knots*, but nature boon
> Poured forth profuse on hill and dale and plain."

I refer to the curious *knots* of flowers which first appeared in print in Mountain's work, and for variations in which ingenuity was taxed to the utmost. Nothing, indeed, can prove more clearly the degree in which this art was prized than the fact that a pamphlet was published in the year 1623, called "Knots for Gardens," and the title in full runs thus:—"Certaine excellent and new-invented Knots and Mazes for plots for Gardens, by which you may truly learne the art of drawing out any Knot according to the plot of your Garden, be it never so bigg; the like not yet published in our language by any author whatsoever." Each page after this title is devoted to a woodcut of some peculiar, and then thought, beautiful knot. Some of the ugliest among them are thus headed:—"A curious Knot;" "A rare Knot for a fine Garden;" "A flourishing Knot;" and "A curious fine Knot." It would have occupied too much space to have given for insertion copies of these woodcuts; but some of the other headings are very singular, and I should like very much to see if any knot designed from some of these headings alone would be intelligible, or at all like the respective woodcuts, to which the headings are prefixed. For example, one knot is described as "the triangular square," another as "the square of diamonds," and a third as "a square triangular or circular." A knot in the shape of a circular square would entitle the author to the honour of having accomplished what has been imagined an impossible feat—the squaring of the circle. But imagine this system fully carried out in all its variety—a rare knot covering the surface of each flower-bed—and we come nearer still to a general idea of the whole effect. Certainly the absurdity of formality could not go much beyond this point. It might have been hoped that nature, however cramped within the whole surface laid out, might have been allowed to luxuriate freely within each of these small narrow beds. But the same formal system reigns even there: and so in every particular division, as well as over the whole plan, formality, straight lines, angles, squares, triangles, and oblongs, rule supreme.

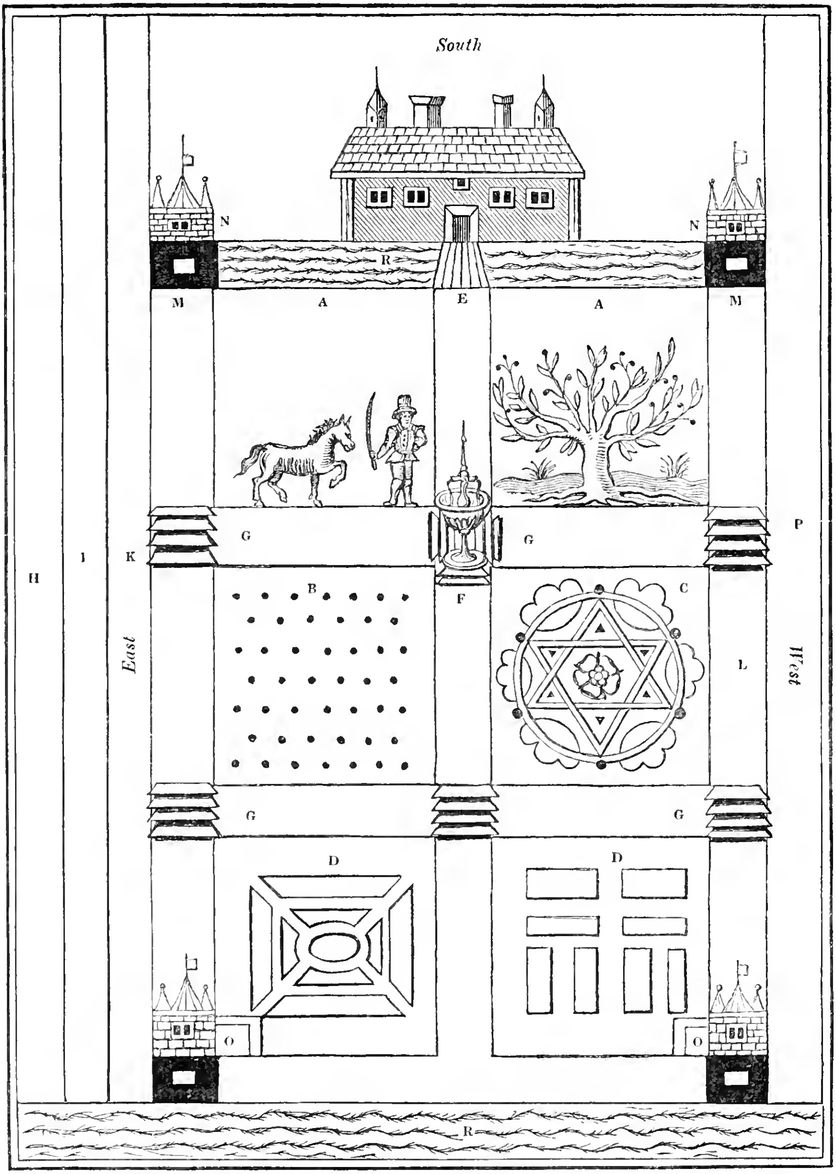
It would be a mistake, however, to imagine that these are the only beauties, although it must be confessed that they were the

predominant ones. Among other things it may be observed, that from the earliest work on the subject to the time of Bridgman and Kent no publication of any pretension was without a woodcut of a *maze*. Indeed a garden without a maze would scarcely have deserved the name. There is certainly no harm in this feature of a garden taken simply as a source of amusement. Indeed one old author frankly confesses this to be their main object. "Mazes," he says, "well framed—a man's height—may perhaps make your friend wander in gathering of berries till he cannot recover himself without your helpe." But a maze might quite as well be placed in some other part of the grounds, for assuredly to the eye of the elevated spectator it yields no object of beauty—it affords no pleasure, but the amusement caused by seeing a very eager and earnest fellow-creature bewildered in an especial quandary. That was one of the Elizabethan garden beauties then: add to it a bowling-green and a place for "a paire of buttes to stretch the armes," and that feature of the arrangement is complete—that portion, I mean, which supplies pleasure of a certain sort—but pleasure quite apart from that which springs from the sight of garden and grounds tastefully laid out. There was another sort of beauty however, or rather combination of beauties, which was thought indispensable. This was the introduction of works of art to embellish the scene; or, as the same author candidly says, "the showing what nature corrected by art can do." He gives us in a few words a general idea of what was seen and admired in those days: and the concluding passage proves how warm the admiration of such objects must have been: "When you behold in divers corners of your orchard mounts of stone, or wood curiously wrought within and without, or of earth (covered with fruit-trees) with staires of precious workmanship: and in some corner or more a sun-diall or clocke, and some antique works, and especially silver-sounding musique, sweet instruments, and voices gracing all the rest—how will you be rapt with delight!"

Bacon's 'Essay on Gardens' fully proves my assertions on these and other points, as well by the practices which he condemns and would abolish, as by those which he would continue and make more extravagant. Some trivialities he censures, thereby proving their then existence. "I, for my part, do not like images cut in juniper or other garden stuff; they be for children." . . . "As for the making of knots or figures—they be but toys: you may see as good sights many times in tarts." But in some other respects, while his main views were greatly in advance of his age, he is guilty of as marked absurdity as William Lawson. For he will have the formal mount and artificial work more *bizarre* than even that enthusiastic worthy could suggest. His

arches in carpenter's work surrounding the garden—on each arch a turret with belly enough to receive a cage of birds—over every space between the arches some other little figure with broad plates of round-coloured glass, gilt, for the sun to play upon—his favourite fountain, with its bottom finely paved, and with images, the sides likewise—and withal embellished with coloured glass and such things of lustre; all these features and more besides, preserved from existing taste or carried to a greater extent, while they surprise us as coming from such a man, show clearly the nature of the taste laid down by Mountain and advocated by Lawson and others of the same date. I should have mentioned, that in all the points established by Mountain, Lawson fully agrees. I have only selected some of those which he notices, but which do not appear in Mountain's work. Perhaps, however, the following woodcut from Lawson will speak for itself, as delineating his *chef-d'œuvre*, the more especially as an explanation of the portions indicated by letters is attached to it.

So ends this explanation. And, as in the case of Mountain's specimen, without assuming this woodcut to be anything more than a general representation of the principles adopted in laying out grounds at that period, we have enough, in conjunction with the letter-press descriptions given in the same and other works, to enable a person to form a just idea of the whole system. Imagine yourself looking down from a window in the mansion upon ground laid out in this manner. Grant that in a few cases, although but a few, there may have been terraces and balustrades and steps: except to an eye that can delight in nothing but angular forms and combinations, no scene could possibly appear more unnatural. But when you stretch your gaze beyond the herbers, and alleys, and walks, and oblong beds, and mathematically arranged knots, and the heavy garden wall, to the undulating surface of the park studded with noble trees, varied by moving objects, and rendered more beautiful by the stream or the lake—the contrast must have been more painful still to a man of true taste. He would be struck with wonder at the thought that the inmates of such a mansion could go on viewing such a prospect for years and years in perfect contentment, without an effort to create beautiful scenes immediately about the walls of their home. It is true that Bacon, however encumbered by tawdriness and littlenesses his views were in part, ventured to throw out ideas far beyond the notions of his age—ideas which fairly entitled him to be termed the prophet of landscape gardening. In its main principles his essay presents almost as great a contrast to the then existing system as was found in Nature herself. At all events the superiority of those principles is too manifest



"A. All these squares must be set with trees; the gardens and other ornaments must stand in spaces between the trees, and in the borders and fences. B. Trees twenty yards asunder. C. A garden-knot. D. Kitchen garden. E. Bridge. F. Conduit. G. Stairs. H. Walks set out with great wood thicke. I. Walks set with great wood round about your orchard. K. The out-fence. L. The out-fence set with stone front. M. Mount. To force earth for a mount or such like, set it round with quicke, and lay boughs of trees, strangely intermingled—tops inward—with the earth in the middle. N. Still-house. O. Good standing for trees if you have an house. P. If the river run by your door and under your mount, it will be pleasant. R The River."

to be doubted. It was starting at one bound from forming a framework of mere angular curiosities or of mosaic, to the painting of a charming landscape, even though marred by some faults or defects in design and in execution. For on the merits of his general conception there cannot, I conceive, be two opinions. He would have the space allotted for this purpose to be thirty acres at least—a vast advance from the pettiness of the old system. This middle ground between the mansion and Nature's own scenery he would thus divide:—four acres nearest to the house he would have formed into a lawn, to refresh the eye and yield a pleasurable spot for contemplation: immediately beyond this would lie the main garden of twelve acres, the favourite flowers and plants for which he carefully specifies: on each side of the lawn and main garden there would run a strip of four acres devoted to covered alleys and to walks, which however, it is manifest, would not be obtrusive objects in the prospect: and beyond the whole what he terms a heath—which however from his own words, "I wish this to be framed as much as may be in a natural wildness," and from his having no trees in it, but only shrubs and plants and flowers disposed irregularly, he clearly designed to soften and smooth down the abrupt transition from the cultivated and ornamented to the wild and natural scenery. Add to this his condemnation of knots and figures, and of clipped trees, in these plain words:—"I, for my part, do not like images cut out in juniper and other garden stuff: they be for children;" and you see that he would remove two of the chief sources of ugliness in the prevailing system. And then bear in mind that he would have fountains to vary the scene still more; and the imagination can pretty well bring before its view a garden so laid out, and appreciate with some degree of accuracy the immense superiority of such taste over the petty, the formal, the angular, the gingerbread, fashionable style of the age in which he lived. But if Bacon were a prophet of enlarged views and foretelling beautiful scenes, he was only a prophet. He could only speak of what he would wish to have done. Fashion was too strong for him to change her character or subdue her power. He could only consign to posterity the task of carrying out his designs, stripping them of all encumbering tawdriness, enlarging their beauties, and making them complete. I may say here, that a century elapsed before a real practical blow was struck at the old fashion, and it was only by the successive efforts of Bridgman, Kent, Shenstone, Wheatley, Brown, and Repton, that whatever faults and mannerisms might occasionally, and for a time only, be introduced, landscape gardening came to be what it ought to be, and what in its main features it is—as far removed from the false fashion of the Elizabethan age as it could by

securing the most tasteful concentration within a given space of the greatest beauties of nature and art.

Glancing back upon this concise description of that assuredly false fashion, I should imagine that no enthusiast—nay, no mo-nomaniacal enthusiast—in favour of the Elizabethan style in architecture, would seriously press, as an accompaniment to the revival of that style, the resuscitation of the fashion in gardening. The truth is that such a notion involves too many contradictions in taste and absurdities in fact to be tolerated by any rational man. In the first place (while it is quite true that there can be no dis-puting about tastes, and that, as a matter of right, every man may be to his own taste, just as he has a right to cut off his own nose, and look very ugly as a necessary consequence), what unavoidable connexion is there between the peculiar style of building invented in one particular age, and the style of gardening which happened to have grown into a certain fashion at that same period? For it is obvious, that then, as now and always, new houses were built in grounds long previously laid out and kept up. It should be borne in mind moreover, that the earliest work quoted by me, which passed through several editions during a considerable course of years, is much more a record of then existing fashion than a treatise propounding a new theory. And the truth is, that all which was cared for, even before the first mansion in the Elizabethan style was erected, was the enjoyment of certain limited out-door comforts and pleasures near the house: all that was effected was as wretched a rule and line arrangement of that small space of ground as ever libelled the taste of an educated man. There is no more connecting link between the house and the garden of that age as to *character* than between a Grecian temple and a Chinese garden—an Italian palace and Westmore-land scenery—a Saxon homestead and Hampton Court gardens—the modern polka and the venerable minuet de la cour.

In the next place, on what principle is it asserted that the ground around the house must be forced into a similarity of style with it, even allowing that such connexion of style did really exist? It is clear that the ground in Elizabeth's time seldom or never formed any part of the architect's design: he took it as he found it: or, if he did not build among grounds already laid out, they were arranged afterwards according to the existing fashion, having no respect to the architecture. The principle, however, which is really involved is this:—Are the grounds and scenery around a mansion to be laid out in an ugly fashion, merely be-cause that ugly fashion existed when the revived style of archi-tecture was first designed; or because the one is assumed to be in harmony with the other? or, on the other hand, is the archi-tecture itself to be in harmony with the general character of the

whole scenery around—leaving the pleasure-grounds and garden adjoining the house to be laid out on the sound principles of landscape gardening—principles, be it observed, which are equally sound in respect to every mansion in every style? Now the connexion of style I have shown not to exist; and I should be not only enlightened but amazed if any ingenious person could prove that the ground-plan of an Elizabethan garden, such as in its main features I believe myself to have correctly described it, is in any harmony whatever with the style of the Elizabethan mansion. I do not wish it proved to have been peculiarly so; I ask it to be proved in any respect and at all. The plain incontestable fact is, that such a garden in such a style is more in harmony with a plain square brick-built house of no style whatever—the angles in the garden, however, giving a relief to the square solidity of the house; and it is equally plain that as taste was at an equally low ebb in all classes who were able to indulge it, the same bad taste prevailed everywhere alike.

Of the other principle—That the style of the architecture should be adapted to the general character of the whole natural scenery, I think that no man can doubt the correctness. Of the magnitude of the building—that is, the having a proper regard to the proportion of the space, and the grandeur, or calm beauty of the scenery in which it is to stand—there can be as little hesitation. Repton's observations on these matters appear exceedingly judicious; and if the principle in question be correct, the laying out of the ground between the mansion and the external scenery, on the universal principles of landscape-gardening, with only subordinate regard to the style of the mansion, is clear as the sun at noon-day. Repton is writing on the inappropriateness of the Grecian style of architecture to large mansions in the country: and he thus goes on:—"Having expressed these objections against the application of Grecian architecture, before I describe any other style of house, I shall introduce some remarks on a subject which has much engaged my attention, viz.—the *adaptation of buildings not only to the situation, character, and circumstances of the scenery*, but also to the purposes for which they are intended; and this I shall call *characteristic* architecture."

It is needless for me to introduce here his arguments on this adaptation of the style of the building to the scenery amidst which it is erected. The case stood thus:—The Elizabethan style had fallen into desuetude in his time, and therefore is not alluded to, beyond his referring in another place to the palaces of that age, without regard, however, to the surrounding scenery. He had to determine between the Grecian and the Gothic styles as to which was on the whole best adapted to the rural scenery

of England. He concludes, and, I venture to say, on very good grounds, in favour of the Gothic style; restricting, however, its use mainly to the *external* appearance of the building; and, as to internal arrangements, retaining its peculiarities only when designing the hall, chapel, and galleries. It is obvious that the same preference, limited by the same restrictions, should be assigned on the same grounds to the Elizabethan over the Grecian. But what is the main principle here involved and successfully vindicated? The principle, that the style of the house is to be made in harmony (as near as possible) with the character of the scenery, and not the scenery to be changed, as a supposed matter of consequence, so as to be in harmony with the style of the house. I repeat, that I do not know of such a connexion ever having existed artistically—I mean, that I never yet heard of the Doric style of landscape-gardening, or the Tuscan, or the Corinthian, or the Gothic, or the Saxon, or the Norman, as necessarily bound up with the corresponding styles in architecture. All that is contended for is, that the character of the scenery around shall be paramount in deciding the style of the building which it surrounds. And if this be true in principle, it is equally so in degree. I am aware that there are many subordinate points of considerable importance to be kept in view; but these do not affect the general truth either in principle or in degree. And that principle is true not only of the wide range of scenery that you view from every side of the mansion, but of every inch of ground, even to the foot of its walls. As the eye falls nearer home, the beauties must be more and more concentrated; but still the system must not be all straight lines, and angles, and mathematical forms; it must not be strait-laced into an unhealthy uniformity or a diseased regularity; it must bring together, even within the narrowest and most confined view, a combination of the fairest beauties of nature and the most graceful efforts of art. Take the opposite opinion as just. Assert that you *must* attach an Elizabethan garden to a mansion built in the Elizabethan style, and you have no choice left but to bind the whole scenery around in the same mathematical shackles; you have no alternative but to imprint the same formal design on the whole space between your house and the horizon on every side. Very beautiful, of course, the effect would be; not at all expensive, nor at all impossible!

I am very far, however, from asserting that no points in this system are good, or that none of them should ever be introduced, even around a mansion not built in the Elizabethan style. But wherever introduced, they must be regarded as the exception, not as the rule—as the foils which make beauty more charming; not as being in themselves intrinsically beautiful. The winding

paths in a pleasure-ground are certainly not the less delightful because they branch out from the broad expanse of the straight promenade. The curve-shaped beds, filled with irregular groups of flowers, do not the less please by their graceful outline because they are studded over the even-sided lawn. And so in every case. The occasional introduction of the regular and the formal can have no other effect than that of enhancing the effect of the irregular and the informal—those characteristics of the true line of beauty—those main and commanding features of Nature herself. Art, and the works of art, may further enhance the beauty of the whole scene; but to revive the Elizabethan gardening as a whole, and in all its principles, would be like reviving the pedantry of that age as well as its learning—its euphuism as well as its pure old prose and splendid poetry—its rude and coarse social customs as well as its chivalrous spirit; and would be in each of these cases as in all, a clear offence against good taste.

II.—*A short Account of Col. Feilding's Coryanth (Coryanthes Feildingii).** By the Vice-Secretary.

In August, 1847, Col. Feilding sent me for examination a flower of a Coryanth, which is so remarkable as to deserve a notice at some length.

The plant was purchased of Mr. Atkins, of Northampton, in 1842, its origin being unknown. It flowered at Street Aston in 1844; in 1845 it was again showing for flower, but missed in consequence of its removal to London; in 1847 it finally produced the extraordinary blossoms which are the subject of the annexed figures.

As usual in this genus the flowers are pendulous and inverted, so that the apparatus of the column hangs downwards instead of being erect. The general colour of the parts is pale brownish yellow, a little mottled and stained with cinnamon in an irregular manner. When closed, the flower is about five inches long and three wide. As it unfolds, the sepals and petals, which are membranous and bear no small resemblance to bats' wings, turn back, seem to fold up, and finally hang drooping at the back of the lip and column, in which organs, as is well known, the singularity of the genus resides.

The lip is borne by a thick horizontal arm an inch and a half long, which proceeds from the top of the flower-stalk, and con-

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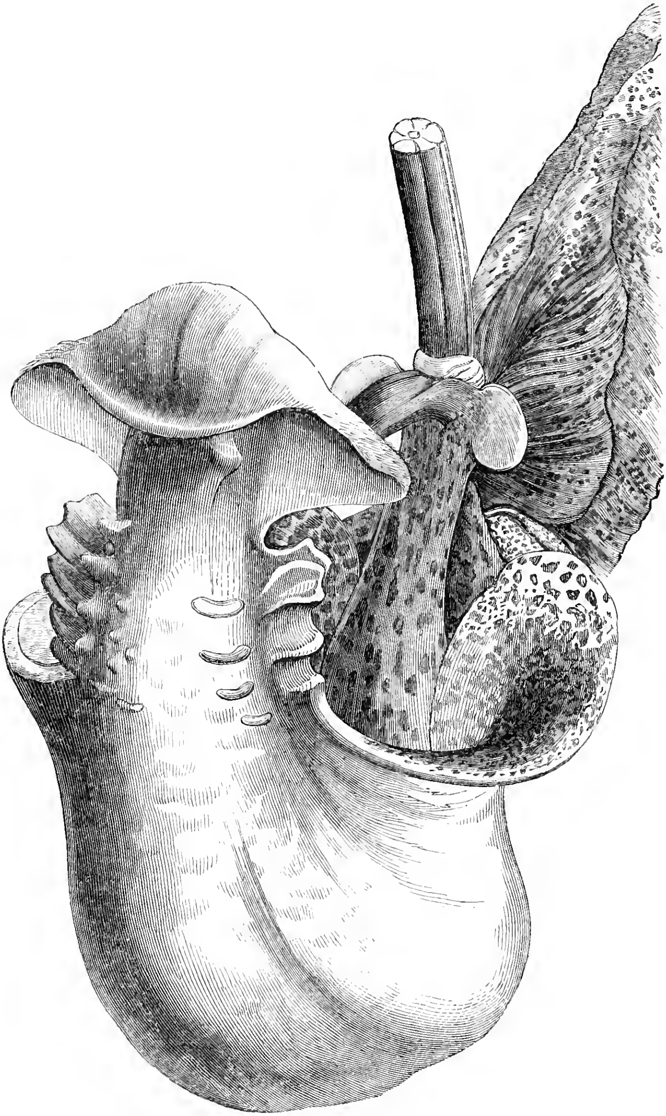
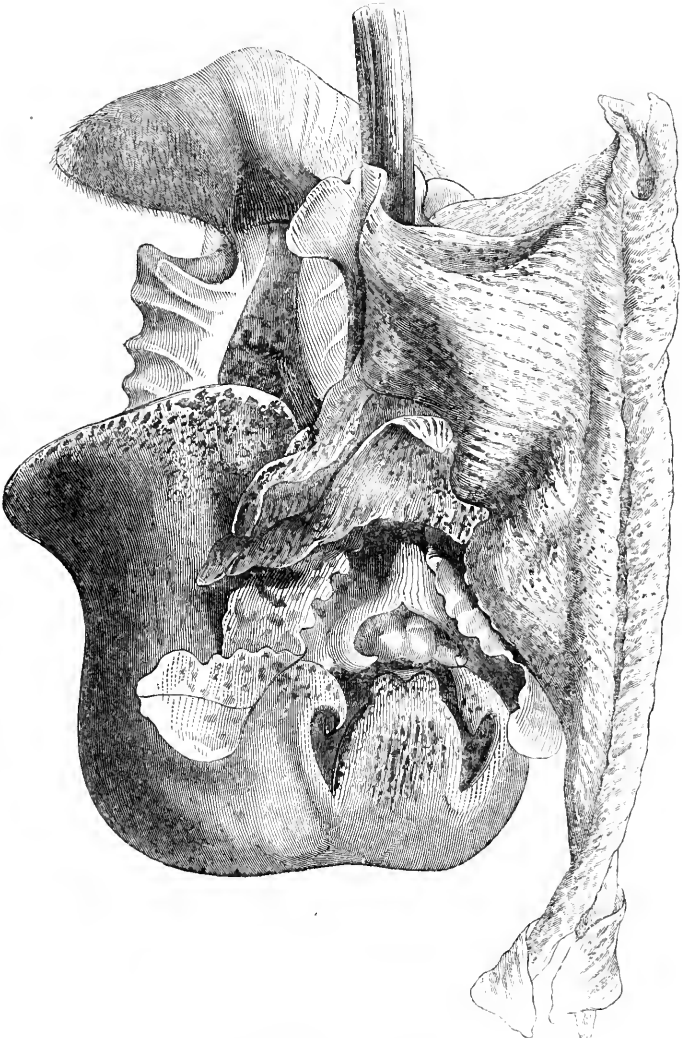
* C. *Feildingii;* hypochilio stipitato convexo sub-compresso calvo basi tomentoso, mesochilio plicato et verrucoso, epichilio galeato sub-quadrato rotundato lobis lateralibus uncinatis intermedio truncato erecto.—J. L.



Coryanthes Feildingii (*front view*).



Coryanthes Feildingii (*back view*).

sequently from the lower end of the column. Right and left of its base are placed two softish fleshy pale ear-like lobes, which are organs of secretion, a sweet fluid continually dripping from them as long as the flower is in vigour. At the other end this horizontal arm expands into a convex cap or hood, hairy in front but bald on the crown; a little compressed from the back, and two inches across in its principal diameter. From the cap hangs down a large fleshy goblet smooth at the edges, flattened at the end, two inches deep and as many wide, and connected with the cap by a hollowed fleshy stalk, which is strongly marked by various transverse fleshy folds, warts, and ridges; into this goblet drips the honey, secreted by the two ears at the base of the horizontal arm which carries the lip. On the side next the column the goblet is opened, and near the bottom of this opening it is furnished with three fleshy sharp-pointed lobes, of which the lateral curve downwards and the middle one stands erect, rising just high enough to come in contact with the head of the column, which grows downwards so far as almost to touch it.

The column is a large fleshy club-shaped body two inches and a half long, and throwing back its head till its bosom becomes so round and large as to be comparable to the breast of a "puffer" pigeon. The head of the column divides into two short flat fleshy curved arms, between which the anther is seated.

This extraordinary species is perfectly distinct from *Coryanthes macrantha*, not only in size, but in the form of the cap, its hairiness, the truncated termination downwards of the goblet, and the plaits or tubercles that occur on the stalk of the latter. Its flower is the largest yet known among orchids.

III.—*Memorandum of an Experiment on the Continued Cultivation of Wheat, in the Gardens of the Horticultural Society.* By Edward Solly, F.R.S., Professor of Chemistry to the Society.

(Communicated Oct. 23, 1847.)

In the year 1843 a portion of ground in the Experimental Garden of the Horticultural Society was sown with Talavera spring wheat, and manured with a series of different saline substances. It was proposed to continue the cultivation of wheat for several seasons in the same ground, and with the same manures, applied precisely as the first year; the crop obtained each year being not only carefully measured, but likewise preserved, in order that it might subsequently be submitted to chemical examination, should it appear desirable. This experi-

ment has now been continued five years, and one or two interesting facts have been observed during its progress; though it was rather to be regretted that the soil in which the wheat was grown was too well manured previous to the commencement of the experiment. It is hardly necessary to observe that the whole experiment was intended as one purely horticultural, or rather even, chemical; and that the results obtained cannot be considered as giving at all accurate information as to the agricultural value of the salts employed as manure.

The general results of the experiment will be seen in the following Table, which shows the whole weight of crop obtained each year per rood:—

Manure Used.	1843.	1844.	1845.	1846.	1847.
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
1. Phosphate of Ammonia, 3 lbs. . .	49 0	34 10	30 11	41 1	45 4
2. Sulphate of Soda, 3 lbs.	33 13	35 2	30 3	36 10	43 0
3. Common Salt, 3 lbs.	46 11	37 15	40 11	32 8	37 4
4. Muriate of Ammonia, 3 lbs. . .	53 1	37 9	39 12	46 12	46 0
5. Phosphate of Lime, 4½ lbs. . . .	46 0	37 15	28 11	32 13	25 3
6. Muriate of Potash, 3 lbs. . . .	51 9	35 0	38 1	30 0	35 14
7. No Manure	35 7	36 4	37 0	42 14	38 3
8. Sulphate of Lime, 4½ lbs. . . .	54 3	43 8	30 11	41 9	60 0
9. Sulphate of Ammonia, 3 lbs. . .	52 3	40 10	36 4	46 2	44 4
10. Sulphate of Magnesia, 3 lbs. . .	49 11	47 2	31 0	31 12	37 8
11. Sulphate of Potash, 3 lbs. . . .	44 10	39 9	39 10	39 8	39 11
12. Nitrate of Soda, 3 lbs.	50 12	33 7	26 8	41 0	41 0

It appears from this table that in the first year the production of vegetable matter was increased by all the salts employed, excepting only the sulphate of soda. This effect fell off more and more in each succeeding year, for in 1844 sulphate and nitrate of soda, muriate of potash, and phosphate of ammonia gave less crops than the ground with no manure; in 1845 we find sulphate and nitrate of soda, sulphate of magnesia, sulphate of potash, sulphate and phosphate of ammonia, and sulphate of lime apparently doing harm; and in 1846 the ground with no manure gave a better crop than any of the others, excepting those manured with muriate and sulphate of ammonia. The fifth year, however, more nearly resembles the second, for in it seven of the salts appeared to do good, viz., phosphate, sulphate, and muriate of ammonia, sulphate of soda, lime and potash, and nitrate of soda.

On comparing together the total produce of each manure, during the whole five years, it will be found that the entire quantity of vegetable matter had been increased in every case, excepting where phosphate of lime and sulphate of soda were employed as manure.

In the preceding Table the entire quantity of straw and grain

together, produced in each experiment, is stated. The following exhibits the quantity of grain obtained from each crop, per rood:—

Manure Used.	1843.	1844.	1845.	1846.	1847.	Mean.
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
1. Phosphate of Ammonia, 3 lbs.	10 10	6 13	1 13	12 10	10 15	8 9
2. Sulphate of Soda, 3 lbs. . .	8 2	7 5	2 5	11 13	12 8	8 6
3. Common Salt, 3 lbs. . . .	13 8	9 10	2 10	11 3	11 6	9 10
4. Muriate of Ammonia, 3 lbs. .	19 9	7 6	2 12	16 10	11 4	11 8
5. Phosphate of Lime, 4½ lbs. .	11 4	8 5	2 11	11 10	8 0	8 6
6. Muriate of Potash, 3 lbs. . .	13 10	9 12	3 2	10 7	9 4	9 3
7. No Manure	7 10	7 13	4 14	15 6	11 14	9 8
8. Sulphate of Lime, 4½ lbs. . .	14 0	9 11	3 10	14 3	15 4	11 5
9. Sulphate of Ammonia, 3 lbs. .	12 6	9 2	4 8	14 10	11 11	10 7
10. Sulphate of Magnesia, 3 lbs. .	12 0	11 0	3 14	10 9	11 0	9 11
11. Sulphate of Potash, 3 lbs. .	10 11	8 6	5 7	13 9	11 5	9 14
12. Nitrate of Soda, 3 lbs. . . .	11 10	3 14	3 9	12 14	10 12	8 6

On comparing this table with the first one, it will be found that the same general result appears with regard to the grain as was noticed respecting the entire crop; namely, that the good effect produced by the various salts the first year does not continue to the third and fourth year; but in the case of the grain, they seem to produce but little effect after the second year. In the first year, each of the eleven salts employed increased the yield of grain; in the second year, only seven of them, namely, the phosphate and sulphate of lime, sulphate of ammonia, muriate and sulphate of potash, sulphate of magnesia, and common salt; in the third year, only one salt, the sulphate of potash; in the fourth year, only the muriate of ammonia; and in the fifth year, the sulphates of lime and of soda. It is evident, therefore, that the effect produced in the fifth year by seven of the salts employed was only an increase of straw, and did not also indicate a corresponding increase of grain.

In order more completely to exhibit this, the results of the two preceding tables have been reduced into the following one, which shows the proportion of grain to the whole produce; the numbers given showing the proportion of grain in 1000 parts.

Manure Used.	1843.	1844.	1845.	1846.	1847.
1. Phosphate of Ammonia, 3 lbs. . .	2:6	315	57	307	241
2. Sulphate of Soda, 3 lbs.	240	357	69	322	290
3. Common Salt, 3 lbs.	289	299	64	344	305
4. Muriate of Ammonia, 3 lbs. . . .	368	297	69	355	244
5. Phosphate of Lime, 4½ lbs. . . .	244	210	82	363	317
6. Muriate of Potash, 3 lbs. . . .	264	263	82	347	257
7. No Manure	215	327	133	358	310
8. Sulphate of Lime, 4½ lbs. . . .	258	350	105	341	250
9. Sulphate of Ammonia, 3 lbs. . .	239	287	120	317	264
10. Sulphate of Magnesia, 3 lbs. . .	241	233	111	332	293
11. Sulphate of Potash, 3 lbs. . . .	239	286	137	346	284
12. Nitrate of Soda, 3 lbs.	229	321	132	314	262

By this table it is evident that the only manure which increased the proportion of grain during the two last years was the phosphate of lime; whilst the only salts which increased the whole produce in both these years were the sulphate and muriate of ammonia. The manures used in these experiments were sown broad-cast over the ground when the wheat was about four or five inches high, and the effect which they produced on the growth of the plants was very marked; it generally became most apparent a week or two before the plants came into ear. The salts of ammonia and the nitrate of soda caused the wheat to grow rapidly and luxuriantly, and gave the plants a dark green colour. Generally, however, the effect of the manure seemed to go off before the time of flowering, and to produce little or no effect at the time of ripening the grain. The sulphate and phosphate of lime, on the other hand, though they produced very little if any effect at the time of application, evidently influenced the wheat beneficially at the end of the season, when the grain was filling. From this it might be concluded that a better result, as far as the production of grain was concerned, would be obtained by employing a mixture of a salt of lime and a salt of ammonia, than by using either alone; and this, no doubt, would hold good on all soils like that of the Horticultural Gardens, containing but little lime.

From the fact just stated, that the ammoniacal manures seemed to lose all effect after a few weeks, it was naturally supposed that, in consequence of the easy solubility of the salts, the whole or greater part of them had in that period been either washed away by the rains or absorbed by the plants. That this, however, was not the case, is proved by the following curious fact:—In the spring of 1845, 1846, and 1847, when the wheat had nearly attained the size at which the manures were to be applied, but still previous to any application whatever, it was very easy to see where the ammoniacal salts and the nitrate of soda had been used the preceding year, as there the wheat was more forward, and the blade had a darker colour and more healthy appearance, than elsewhere. This proved that the diminished influence produced by the manures could not be due to their exhaustion, as enough remained in the soil some months afterwards, and when the soil had been exposed to half a year's rains, to produce a marked effect on the next year's crop.

IV.—*The Potato, its Condition in* 1847. By George John Towers, C.M.H.S.

(Communicated Aug. 16, 1847.)

HAVING stated in the last volume of the Journal the results of my own experience and observations during the year 1846, I feel called upon to offer a few remarks in continuation. The disease, which beyond all doubt ravaged the crop to a very alarming extent during two entire seasons, is evidently on the decline; at all events the period is now passed at which it was in active operation; and as moreover the crops everywhere, which I have been able to inspect, are healthy, and gradually assuming the yellow tint that precedes maturity, without the appearance of one single *black spot*, I think we may, without presumption, indulge a hopeful expectation. Of *proximate* causes it should seem that, in reality, we know nothing; yet, perhaps, while collating the evidence of facts, some light may be obtained which will guide us in our future operations, and obviate those errors in practice, which assuredly have concurred to aggravate, if not originate, the malady.

During the whole of the spring of 1846, every fact seemed to prove that the presence of disease in the tuber of 1845 did not interfere with the sprouting of the plant: by *disease* I mean that discoloration or marbling of the tissue which, without affecting the vitality of the eyes, so changed the condition of the tuber as to destroy its culinary qualities. Numbers of such potatoes were committed to the ground uncut, and many—proved by the knife to be so diseased—were planted as sets, expressly with a view to ascertain whether or not a sound progeny could be obtained from a tainted stock. I stated the results of such experiments; I even found that from a mass shot down in a heap from a barrow —a great portion of which was in a state of putrescent decay— numbers of apparently healthy shoots were produced, the whole of which continued strong and verdant several days after the general attack had taken effect—that is from about the 25th July to the end of the first week of August, 1846. It will, however, be perfectly useless to dwell upon the symptoms or progress of the malady of that year; but not so the allusion to the two undeniable facts. 1st. That a disease had for many years prevailed in the northern counties which was termed *the rot of the potato*. Many articles appeared in the newspapers and in the agricultural periodicals of the period, dating its commencement about the year 1833; and some of these I replied to, as I had failed to discover any sign of decay among the plots of the midland or southern districts. It was stated that blanks and

patches occurred in the rows: that upon investigation it was seen that the sets planted had either disappeared, or were reduced to a mass of putridity. But no complaint of spot, or decay of the herbage and stems, or of any peculiar smell of decomposing vegetable matter, was made till the epidemic of 1845 was established.

2nd. The crop of 1846, though to a very alarming extent affected, was reduced more by *drought* than by disease. They who planted for themselves and waited the results, must be aware that, as from the 20th of May to the 22nd of June, no rain fell, and that a blazing sun, rarely obscured by a cloud, had poured its fiery beams upon the surface of the ground, daily, for about 14 hours, vegetation must have been fatally checked.

Young tubers were produced, and brought to precocious maturity—some showers came at midsummer, and stimulated these tubers—a second progeny was developed; and thus, as in every similar case, *both* became valueless: I dug up my early and second early varieties from ground dry as dust; the lime that I had placed about the sets at planting remaining white and powdery as when deposited; the produce was two and three little potatoes to a set, not in the whole averaging three times the weight of the seed. Disease there then was none; but as the season of vegetation had thus been lost, the entire stock was reduced far below par: I record this fact with the sole view of correcting a mistake which prevailed at the time of digging, and to prove the consolatory truth that disease had not existed in a more aggravated form than it did in 1845; but that, on the contrary, its virulence had abated. In a word, had there not been one diseased leaf in the land, the produce of 1846, as a whole, could not have amounted to the half of an average crop!

Every circumstance of this singular visitation admitted, however, of some exception; and therefore the last observation must be received as applying chiefly to the South, where drought prevailed. Scotland had more rain, and there the disease proved more malignant than in 1845. There is also reason to believe that it travelled progressively; leaving, or becoming milder in, one locality, and visiting another; thus in some degree resembling the advances of the Asiatic cholera.

I now come to the present year 1847; in which, though unquestionably there have arisen from time to time threatening symptoms (very partial and arbitrary), yet they have assumed a new form and type. Thus we were told of the cracking or abrasion of the cuticle underground, with discoloration of the parts from which the tuber-bearing processes proceed. Some of these I saw, and attached to one of them was a minute tuber, which appeared slightly affected. I was called to inspect a

five-acre plot in a field at Waddon Marsh, where some of the leaves began to look yellow and drooping; this was about the 10th of June. Not one spot, or any other symptom, above or below the soil, could be detected; but it was remembered that a partial hoar-frost had been observed on the seventh morning after that singularly piercing cold day of the 6th; and thus the effects observed were fully accounted for. I repeated my observations after several intervals; the plants grew well and prospered; so that during July the owner sold the potatoes for 25*l.* per acre; they were the early *Shaw's*. Everywhere about Croydon, and many miles around, potatoes had been planted: I examined every plot in field or garden that I could approach, and made all possible inquiries where I could not inspect. Market and gentlemen's gardeners, salesmen, farmers, all were in one tale; their evidence was consentient; and this was borne out by the products, speedily and abundantly brought to the shops. By letters from Gloucestershire and Hertfordshire I was informed that the potatoes were "rotting in the ground;" that a curl of the leaf indicated a certain destruction of the lower stem, which existed to a very threatening extent. After a few weeks these parties, my correspondents, wrote again to say; one —that the potatoes "were doing well;" the other—that there was much amendment, and that the attack was only partial! At the present time (the 15th of August being past) I have found no reason to alter the opinion which I had long formed of the gradual but certain abatement of the malady. A gentleman called on the above-named day; he had just returned from Germany and Russia: in those countries there is abundance —no thought or fear of disease remains; in a word, general fertility, particularly in fruit, is manifest to an extraordinary extent. These truths induce me, while I disclaim any assumption of knowledge, to offer the following suggestions, to which I would premise an earnest recommendation that every gardener do attentively peruse the two essays on the potato—its disease, cure, and treatment, by Mr. Jasper Rogers of Dublin; for although the exceedingly wide diffusion of the disease in the years 1845-6 may excite some doubt of the validity of arguments which apply to *local* treatment, yet so unquestionable are the truths he appeals to, that if some perplexity remain, we cannot fail to profit by duly attending to his advice.

Disease, or rather *debility*, the result of disease, still exists; and though, as we have proved, diseased tubers have produced strong plants, yet, as the Prize Essay in a late number of the Royal Agricultural Journal demonstrably showed, *the propagation by tainted seed* must contribute to the maintenance of a diseased condition. That millions of tubers more or less in-

fected were planted, must be acknowledged; how then is it possible that we should now escape?

As debility has followed as an inevitable result, we ought to take a retrospective view of our treatment of the potato! Have not the pits and stores been formed upon the most erroneous systems? Have not heat and moisture during the entire winter excited the tuber to premature activity; and as a consequence (so argues Mr. Rogers), has not the seed-stock in almost every instance been planted in a state of exhaustion? A few sound ash-leaved and other early varieties, preserved expressly, may have been planted sound, every eye dormant, not one vitalized development pre-excited; but, as concerns the later winter stores, have not the planted tubers in nine cases out of ten produced strings from several of the eyes, which have matted one into the other for many feet in length? All these developments having been nourished by the tuber, are broken off as refuse, and the tuber thus exhausted, and its tissue rendered flaccid, is, forsooth, planted as seed! Such is and has been for years the mode of practice throughout Britain, perhaps throughout the world. Can we then wonder that an organism so treated should succumb under a peculiar meteorological epidemic, which though veiled in mystery afforded ample proofs of its existence?

If we admit a consciousness of ill-treatment on our part, would it not evince a more wise and pious state of mind to consider the late alarming dispensation as a blessing in disguise, rather than to ascribe it to the judgment of Heaven? We have erred—our errors have led to certain consequences—let us learn wisdom, and henceforward treat our comforts and mercies as blessings to be cherished—not as if they were mere offal, worthy only of the refuse-heap.

Mr. Rogers and others suggest carbonised matter as the grand chemical remedy: we cannot err by applying it to the utmost attainable extent; and I would add, we shall obtain carbon, and do the land much service, by paring and burning in every case where portions of orchard or pasture land could be appropriated for potato-culture. "Try all things"—but above all, let a stock of tubers be thoroughly greened by exposure to air and light, and then be stored in a cold dry cellar, cave, or room, where no wet can enter, but from which frost only, as respects cold, should be excluded.

One symptom of debility—if so it can be considered—I overlooked; it is the absence of seed; or, in other words, the inability of those varieties of potato which are usually very fertile, to support any "apples" or seed vessels. I find my plants in full bloom; every blossom falls off, and yet the herbage is amazingly strong. My attention was called to the phenomenon by a very acute observer.

Rain has at length (Aug. 16th) visited this arid and parched locality—will disease follow? time must show; but none remains ere this imperfect communication must be despatched to the press.

V.—*Memoranda respecting the Cannon Hall Muscat Grape.* By Alexander Wilson, gardener at Cannon Hall.

(Communicated August 16, 1847.)

It is nearly a quarter of a century since the Cannon Hall Muscat Grape was sent from here to the Horticultural Society, and considering that it is one of the best and largest grapes grown in this country, is it not rather strange that so few are found who give it that attention which it deserves? It is said to be a bad grower, and that it is difficult to get the fruit to set. This is partly true; none of the Muscats set their fruit so freely as some of the other sorts under ordinary treatment: place them in a situation natural to them, and they will be found to bear fruit as freely as the Black Hamburgh.

In propagating this variety, I take the ripest shoots, and cut the eye or bud out with as little wood as possible, inserting them in pots of sandy loam; they are then plunged in a good bottom heat, and encouraged in their growth as much as possible during the early part of the season, so that the wood may be perfectly ripened by the middle of September. As soon as the leaves drop, they should be cut back to within two feet of the ground, when they may be planted, if the border is made in the inside of the house, taking care that no part of the stem is buried in the soil; but if the border is on the outside, they should be grown another season in pots, so that the wood may be two years old before it is exposed to the weather, for I find that one year old wood is apt to damp off at the surface of the soil. In making the border, take care that it is not made too rich. Loam, leaf mould, and bones laid on a dry bed are all that is necessary.

I have tried to force the Cannon Hall at almost all seasons of the year; but we have always had the best crops when we did not begin before the middle of January. They may be forced earlier, but the crop will be small. Beginning with a very gentle heat at first, keeping the house as moist as possible, and gradually raising the temperature as the growth of the vines advances, so as to have the night heat, when the vines are in blossom, at 75°; and during the day 100° is not too much, if they have a little air. The vines, if healthy, will show three or four bunches on every shoot: cut them all off but one, and stop the shoots three leaves above the bunch, nipping off with the finger and thumb any shoots that make their appearance at the axils of

the leaves; the bunches are large, and at the end formed like the flower of a cock's-comb, with a stem nearly as thick as the branch from which they grow, and the flowers are so thickly set on them that they have not room to expand. With a pair of sharp-pointed scissors we cut off all the little clusters of flowers in the inside of the bunch, and thin the others as soon as they separate from one another, which is generally three or four days before they open, taking care to make them thin enough; in doing this the bunch should never be touched by the hand, and a little practice will convince any one it is unnecessary.

As soon as the Grapes are fairly set they should be well thinned out, and a steady moist atmosphere kept up in the house until they are ripe. They should never be syringed, as water thrown upon the berries makes them turn black upon the sides and fall off, and this will also be the case with them if the borders at any time get too wet, more especially during the time the fruit is stoning.

Last year I selected three good plants of Cannon Hall Muscat, and plunged them in three different pits in which we grow melons; one of the pits was filled with tan, the second with good oak leaves, and the third with half rotten leaves, which had been previously used in a pine pit. These pits are heated by two hot-water pipes, which run along the front, and the air from the outside can be made pass over them; the atmosphere in the pits was kept as nearly as possible the same, but the bottom heat was very different. The tan soon heated to between 80 and 90 degrees; the fresh leaves never got above 80 degrees; and the rotten leaves had scarcely any heat in them at all; they might be said to be neither hot nor cold until the vine began to grow, and the heat in the pits increased, when a little heat could be perceived in them about the time the vines were in blossom. All the plants grew vigorously, and one bunch was left on each plant. They were treated as I have already stated as to thinning and temperature, and I do not think there was one blossom which did not set, and when they ripened there was not one bad berry upon one of them. Those which had most bottom heat ripened the first, but the last were the finest fruit; if, therefore, the border of a vinery can be heated a little, and that heat increased as the vines advance in their growth, success will be sure. And does not this account for the eminent success of Mr. Murray, of Polmaise? His vines are planted in the inside of the house; and as the temperature of the house is increased, so must that of the soil, from the air being necessarily hotter which passes through the drains to the furnace, and on its way giving out heat to the border. In such a house the Cannon Hall Muscat may be as easily grown as the Black Hamburgh in ordinary vineries.

VI.—*On the Cultivation of British Orchids.* By Mr. David Cameron, C.M.H.S., late Curator of the Botanic Garden, Birmingham.

(Communicated Aug. 26, 1847.)

WHILE tropical Orchids have been eagerly sought after and successfully cultivated, is it not singular that the culture of our native Orchids should be almost entirely neglected, many of them possessing as they do considerable beauty as well as singularity of form? They are a tribe of plants which under cultivation would be highly interesting, and the more especially so as several of the species may be grown for years in the open border with little or no care, and most of them may be preserved in pots. Some of them have fragrance to recommend them, particularly Gymnadenia conopsea and Herminium monorchis, both of which when in quantity perfume the atmosphere for some distance—a circumstance which often affords a clue to their discovery, in the absence of which they might have been overlooked.

The Horticultural Society in their schedule of prizes of the past season offered liberal awards for collections of native Orchids, without even stipulating the number or length of time the plants had been under cultivation, but I believe not one was exhibited. To what can this be owing? Not to want of skill to cultivate them, for the skill shown in the management of other plants proved the ability to cultivate these. But a solution of the question is to be found in the fact that the attention of the cultivator has not been turned in that direction. Having, however, whilst residing in Surrey, within a few miles of the natural habitats of many of the species, obtained some experience in their cultivation, and having also at Birmingham continued to cultivate with success such species as could be obtained, I am induced to offer some remarks on their cultivation, in hopes that it may stimulate other cultivators to bestow some attention on this truly interesting class of plants, many of which may be obtained in their own neighbourhoods, and therefore only require the trouble of digging them up. One season is possibly as good as another for gathering them, whether in flower or not; but, on the whole, spring, at the time they are just commencing to grow, is perhaps the most favourable time, but it requires a knowledge of their places of growth to be able to find them at that season. At whatever time they are got up, it is desirable to get the tubers with as many fibrous roots as possible, and before planting to clear away all the soil carefully from them. They should be planted entirely in fresh soil prepared for them, for I have found

that those planted with balls of earth never thrive well or live long, owing, no doubt, to the native soil becoming sour by being inserted in that of a different texture. I have never found it necessary to use any chalk in the soil even for those which are natives of chalk hills. When in Surrey, charcoal was not then used as an ingredient in soils for pot-plants, but I have since found it serviceable in the culture of native Orchids; it keeps the soil open and porous, and thereby becomes a preventive of sourness and clamminess after heavy rains in winter. Charcoal should also be used in a coarse state for drainage, for their roots run freely amongst it. In watering, the system of little and often is preferable to giving a large supply at one time; indeed more plants have perished by an over supply at one watering than by all other causes put together; it is also beneficial occasionally to remove some of the top soil, and to replace it with fresh mould, so as to keep the surface pervious to air and sun. The following is a list of sorts with whose culture I have been pretty successful.

Orchis Morio, L.—This is pretty generally distributed over moist clayey soils; it requires to be kept in pots in loam and peat mixed with a little sand; several roots may be planted in one pot, which should be well drained. They may be preserved for years if kept tolerably dry in winter and sheltered from spring frosts.

O. mascula, L.—grows on clay soils, chiefly in or near coppices, and in some places is very abundant. It does tolerably well in the open border; if kept in pots, the latter should be rather large, as it makes strong roots. Pot with loam, peat, and sand, using plenty of drainage, and let the plants be kept rather dry during winter, and protected from frost in spring.

O. fusca, Jacq.—I have had but little experience with this, having only received some plants when in flower last year, and without fibres left to their roots. They were potted in a mixture of loam, peat, and sand, with the pots well drained, and were placed in a cold frame; they ripened their leaves and stems, and again came up strongly this spring, and were doing satisfactorily until by some oversight they received a deluge of water over head and in the hearts of the leaves, which soon perished, and the tubers probably also perished soon afterwards.

O. ustulata, L.—This small but pretty species is a native of dry sunny chalk-banks, and must be kept in pots at all times in a mixture of peat, loam, and sand. The pots should be well drained and placed in a cool shaded frame all the year. By a shaded frame is meant one so placed that the mid-day sun does not reach it, and not darkened by a shading of mats.

O. maculata, L.—is one of the most common of the British

species, and may be treated as a common border plant requiring no care; it may also be cultivated in pots in a mixture of loam and a little peat, and likes a shaded situation all the year. I have grown it in pots for years, and occasionally have found self-sown seedlings come up in the adjoining pots: these seedlings appear to come to maturity in the second year. The seedlings of this and others come up in pots containing dwarf bushy plants, whose foliage covers the surface of the pots.

O. latifolia, L.—is also a common species in wet meadows, different plants exhibiting considerable variety of colour. It succeeds well in a shaded rather damp border. It may be potted in peat mixed with a little loam, and may be kept out of doors all the year. Seedlings which spring up in other pots have been found to come to maturity the second year.

O. pyramidalis, L.—is a showy, rather late-flowering species. It has succeeded best in pots: the tubers being small, several may be placed in one pot. It likes loam with a little peat, and plenty of crocks. It should be placed in a cool frame, giving little water during winter.

O. hircina, Scop.—This is a late-flowering, showy plant; but, being a very rare species, I never could obtain more than one very small tuber, which was potted in loam, sand, and a little peat, and kept constantly in a frame, where it was preserved for several years, but never attained sufficient strength to flower. From what I then saw of it, I should consider it was not difficult to cultivate. Plants might be obtained from France, where it is said to be more plentiful.

Gymnadenia conopsea, R. Br.—is desirable for scent as well as beauty, and will thrive in the open ground for years where the soil is light. When kept in pots, it should be grown in loam, peat, and sand, mixed with crocks, and placed out of doors all the year. This is also one of those species from which self-sown seedlings are sometimes produced.

G. albida, Rich.—I never had more than one root of this, which was potted in loam, peat, and sand, with crocks, and constantly kept in a cool frame. It lived several years, but never flowered.

Aceras anthropophora, R. Br.—should be kept in pots, in loam, peat, and coarse sand, with plenty of crocks. It should be placed in a cool shaded frame throughout the year, and sparingly watered when in a dormant state.

Habenaria viridis, R. Br.—bears cultivation well in pots placed in a shaded situation. As it grows naturally in light, damp, sandy soil, it should have loam, peat, and coarse sand mixed with plenty of crocks, and, the roots being small, several may be placed in the same pot. I have flowered it successively for several years.

H. bifolia, Bab.—The smaller butterfly orchis grows chiefly on dry chalky banks, and is safest in pots in loam and peat, with plenty of drainers. It should be placed in a cool frame while dormant, and taken out when beginning to grow in spring.

H. chlorantha, Bab.—This is a more robust plant than the last. It is to be found in clayey coppices, and should be potted in loam, sand, and a little peat, with drainage, and may be kept out of doors all the year.

Ophrys apifera, Huds.—should be kept in pots; and, as there are few fibres to the tubers, several may be put into the same pot, using loam, peat, and sand. It should be kept in a frame during winter, and not put out of doors until the flower-stems have become somewhat advanced. Roots brought from Reigate Hill in March, 1843, were still alive this spring.

O. aranifera, Huds.—I never had more than one root under cultivation, which was preserved for several years in a cold frame, potted in loam, peat, and sand, with plenty of drainers. It did not appear to be difficult to cultivate.

O. aranifera, var. fucifera, Hook.—Several roots of this variety were received from Kent some years ago, and were potted in a mixture of loam, peat, and coarse sand, with plenty of crocks or drainers. The plants were kept in a cold frame during winter, and out of doors in summer, and were preserved three or four years.

O. muscifera, Huds.—should be kept in pots planted in light sandy peat mixed with a small portion of loam, the pots being well drained. As the fibrous roots are small, several plants may be placed in a pot. They should be kept in a cold shaded frame the whole year, and watered sparingly while dormant.

Herminium Monorchis, R. Br.—is a small species, seldom more than four inches high, with small yellowish green flowers, which smell like honey. It should be potted in peat, loam, and sand, with plenty of drainers, and may be constantly kept out of doors; the roots being very small, several may be placed in a pot. It increases itself tolerably by sending out underground rhizomes, at the extremities of which a fresh tuber is formed. It bears cultivation well.

Goodyera repens, R. Br.—is an extremely scarce species, only to be found in a few fir woods in the Highlands of Scotland. It grows in dense creeping masses, and might be obtained in large patches by paring off the soil on which it grows. The roots do not run deep into the soil, and it is not difficult to cultivate. I have grown small pieces till they covered the whole surface of the pots. It flowers sparingly. It appears to like very light sandy peat, with the pots half filled with drainers, and it should always be kept in a cold shaded frame.

Spiranthes autumnalis, Rich.—This bears cultivation well. It is generally reputed not to appear in the same place for several years after flowering; but I have always been able to find it within one or two inches of the place where it has flowered, sending out a small rhizome forming a bulb at the point: the old bulb dies after flowering. Several roots may be planted in a pot in loam and sand, using plenty of drainers. The pots may be kept out of doors all the year.

S. gemmipara, Lindl.—I received one plant of this rare species from Ireland two years ago while in flower. It was planted in very light sandy peat with drainers. The plant came up well, but unfortunately perished from being overwatered.

Listera ovata, R. Br.—is a common plant in woods, &c. It thrives well under cultivation either in pots or in the border. For pot culture use sandy loam and rather large pots, which should be kept out of doors the whole year.

L. cordata, R. Br.—This small plant bears cultivation well in pots, using fine sandy peat and plenty of drainers. Being very small, a dozen or more roots may be put into one pot. It may be kept out of doors the whole year in a shaded place.

Nettia Nidus-avis, Rich.—I never could preserve this species after the first season, although various ways were tried to manage it.

Epipactis latifolia, All.—Epipactises having fasciculated bundles of roots, require much care to get them up in a fit state for cultivating. This species may be grown in pots, in loam, sand, and peat. It may be kept constantly out of doors.

E. purpurata, Sm.—is extremely difficult to get up, being generally amongst clay and flints, which are hard and solid, requiring a pick-axe to move them. It succeeds tolerably well potted in loam, sand, and peat, using crocks or drainers, and placing the plants in a shaded situation.

E. palustris, Sm.—A creeping species, easily increased by underground runners. It may be planted in peat, in a shaded damp border, where it will grow and multiply speedily. For pot culture use light sandy peat and drainers. The plants may stand out of doors all the year.

Cephalanthera grandiflora, Bab.—I grew this in pots, in peat, loam, and sand; but it seldom or never came up the second year.

C. ensifolia, Rich.—I treated this the same as the last, but had no better success.

Liparis Loeselii, Rich.—I flowered this several years successively in pots filled with sandy peat. It was kept constantly in a shaded situation out of doors.

Cypripedium Calceolus, L.—This is perhaps best grown under

a hand-glass in a peat border, where in the course of a few years it becomes so strong as to produce six or eight flowers. It may also be cultivated in pots, which should be kept in a shaded place. The soil it appears to like best is sandy peat, with plenty of drainage.

VII.—*An Experiment in Planting.* By Peter Mackenzie, of West Plean, Stirling.

(Communicated August 10, 1847.)

Much has been said in gardening periodicals respecting the shallow planting of fruit-trees; and perhaps, after all, more may be said and done yet, for we seldom get at the best way of doing a thing all at once. We have been often told that deep planting is a bad thing, and is the cause of much evil to fruit and fruit-trees, and the cause of much disappointment to cultivators. All may not know that it is not for the welfare of trees and bushes to have their roots colder in the soil than the stem and branches in the atmosphere; but the explanation is given in the "Theory of Horticulture."

"The reason why it is necessary to plants in a growing state that the mean temperature of the earth should be higher than that of the air is sufficiently obvious. Warmth acts as a stimulus to the vital forces, and its operation is in proportion to its amount within certain limits. If, then, the branches and leaves of a plant are stimulated by warmth to a greater degree than the roots, they will consume the sap of the stem faster than the roots can renew it, and therefore nature takes care to provide against this by giving to the roots a medium permanently more stimulating, that is warmer, than to the branches and leaves."

Some time ago I planted some fruit-trees and gooseberry-bushes in different positions, with the intention of exposing the roots of some of them as much as possible to the influence of all sorts of weather; not all at once, but gradually, so that they might not be injured from the want of their earthy covering. A young gooseberry-bush was planted upon a small mound of earth, with a stake in the centre of the mound; the stem of the plant was tied to the stake to prevent it from falling, for the slight covering of earth which the roots got was not sufficient to support the plant, and the bush had more the appearance of being punished for some transgression than one expected to live, for it was well secured to the stake, and had little attachment to the soil of this world; but it is wonderful to what plants and animals may be trained—

> Fingit equum tenera docilem cervice Magister
> Ire viam quam monstrat eques.

An old writer says, "I have often wondered at that ill-natured position which has been sometimes maintained, namely, that a man's knowledge is worth nothing if he communicates what he knows to any one besides. There is certainly no more sensible pleasure to a good-natured man than if he can by any means gratify or inform the mind of another." It might be added, that this virtue naturally carries its own reward along with it, since it is almost impossible it should be exercised without the improvement of the person who practises it.

As every ray of the rising sun that gilds the morning, helps to dispel the darkness from the world; so even a successful mode of planting a gooseberry-bush may add to the flood of day that is breaking in upon the minds of the lovers of gardening.

Although the roots of the plant were so slenderly covered from the heat of summer and the cold of winter, the plant grew well; and in process of time the main roots grew strong, and are exposed to the weather as much as any other part of the plant, and the stake has become rotten and removed, and the small mound of earth taken away, and the stem and branches of the plant are supported upon a dome of roots that bids defiance to the strongest gales.

I think it was in the month of May last that its strength was pretty well tried by a storm of wind, which continued for some time, and did considerable damage to many things in the garden: there were few of the gooseberry and currant bushes that escaped injury less or more; some with broken branches, others laid on their sides, and some of those that were planted on the same day and in the same sort of soil, but whose roots were deeper in the earth, and their heads about half the size of the one already noticed, yielded to the blast, although they were supported with stakes.

Such a mode of planting and training the roots of some trees and bushes may be useful in soils that are cold by reason of moisture or situation; or in exposed places they may resist the storms that often overturn plants whose roots are not strong enough, or spreading enough, to give security to the rest of the plant; and, among other advantages, a heavier and a better crop of fruit may be expected.

VIII.—*On the Conditions of Growth necessary to the Production of Bloom in Inga pulcherrima.* By William Wood, Fishergate Nurseries, York.

(Communicated November 2, 1847.)

This is one of the most brilliant flowered stove-shrubs yet introduced to our gardens, and on account of its moderate size is

well adapted for small and select collections. To bloom it well it requires to be restricted in growth ; it thrives in ordinary mixtures of soil—will endure opposite extremes of temperature, and its elegantly-winged leaves, and extremely rich pendent clusters of crimson tassel-like flowers, render its possession much to be desired. Indeed, than this, few plants possess stronger claims to attention.

As one of a class of plants, therefore, whose natural habits of growth are unfavourable to a general formation of flower-buds, and as all attempts hitherto to obtain such by ordinary culture have proved unavailing, the cause of its infertility, as well as that of plants generally, affords a suitable subject for inquiry.

The principal cause to which a failure in the production of flowers is to be assigned, is unmatured growth ; but as this defect is not solely the result of deficient exposure to light, air, heat, &c., the remaining conditions will be noticed hereafter. It may, however, be observed, that of those plants wherein the greatest difficulty exists in obtaining bloom, the ultimate success has been in proportion to a judicious limitation of the annual growth, and the attention paid to a cessation from growth, which should be varied to suit the character of the species—especially in deciduous plants.

Inga pulcherrima is a ligneous or hard-wooded semi-deciduous stove-shrub, producing comparatively small and slender lateral growths or side branches. A gross and luxuriant habit of growth is unfavourable to fertility ; but the plant in question is strongly marked by the opposite condition. The following treatment will result in obtaining a good display of bloom :—

In common with other plants of similar nature, about equal parts friable sandy loam (from well-decayed turf) and heath-mould, with tolerable free bottom-drainage, will be found most suitable. In the stove it may be exposed to from 60° to 75° of summer temperature. If potted liberally with regard to its amount of soil at each potting, the operation should not be repeated beyond once in two or three years; and from its partially deciduous habit, a vigorous growth should be encouraged during the early summer months, supplying the plant with weak liquid manure, in the proportion of one gallon to four of pure water, twice each week, for a month, during its most vigorous period of growth. When the current year's shoots have attained from 8 to 14 inches in length, and their wood appears to have become firm, their progress should be checked by pinching off the extreme top bud of each, and in about a fortnight's time the shoots should be permanently shortened by cutting back each shoot, two, three, or four joints, for the purpose of maturing the lower ones, and enabling the remaining growth to assimilate the

secretions necessary for bloom. As the shoots generally become ripened, the circulation of sap should be sufficiently checked to prevent a premature excitement of the leaf-buds, by placing the plant in the driest and coolest part of the stove, well exposed to light and air. The ordinary watering should be gradually lessened, and a partial cessation from growth maintained until the ensuing spring.

The foregoing treatment in the cultivation of Inga pulcherrima is based upon the following principles, which are also applicable to the growth of plants generally whose natural habits are unfavourable to a general formation of flower-buds.

1. All plants under artificial culture in pots, &c., according to their respective habits and conditions of growth, and the different amounts of soil in which they are grown, are only capable of maturing a certain amount of growth annually, and it is upon a correct estimate of the extent to which such conditions can proceed, in connexion with the period in which growth is attainable, that the amount of fertility depends.

2. All growth in plants (whatever may be its mean vigour) is deficient in maturity for the purpose or formation of bloom, if, for want of proper training, or due exposure to light, air, heat, or moisture, or the requisite period of repose after growth, or before bloom (as required), it fails to accumulate in its proper season the amount of sap essential to fertility; and that management is imperfect which fails to control the circulation of sap by a judicious training of the growth, so as to prevent its excessive accumulation in one branch, or its defective secretion in another.

3. The most general conditions of growth in plants, considered unfavourable to the formation of flower-buds, may be referred either to an excess or to a deficiency of those vital secretions of nutritive matter necessary to fertility. Where such conditions are present, the remedial influences (other conditions being equal) are the following:—1st. Where excess is manifested by too gross and luxuriant growth, exposure to a lower and drier atmosphere, strong light, &c. for a given period previous to the season of bloom, will be efficient. 2nd. Where deficiency is manifested by weak, attenuated growth, and abortive buds, a simple restriction of the growth, by shortening the growing points of each shoot, at the period of the plant's attaining its highest vigour, will enable the remaining growth to accumulate the vital secretions essential to fertility.

4. As the formation of flower-buds in plants depends upon a sufficient amount of nutritive matter being deposited and matured in the growth of the current or previous year, and as the maturity of growth in plants depends upon its partial restraint,

and due exposure to light, air, heat, &c., it follows, that any infringement upon these necessary conditions or laws of nature will tend to render growth unproductive of bloom, by expending the vital forces in the production of abortive shoots.

IX.—*On a form of Scab in Potatoes.* By the Rev. M. J. Berkeley, M.A., F.L.S.

There are two very different diseases known commonly under the name of scab, of which one is far more general than the other, but, at the same time, less injurious to the intrinsic value of the tubers, though, in point of fact, reducing their market value in consequence of the rough pocky aspect which it produces.

The first, of which it is not now my intention to treat, was described and figured by Martius (Die Kartoffel-Epidemie, p. 23, tab. 2, figs. 9–13; tab. 3, figs. 36–38), and is characterized by the presence of an olive-green or brownish pulverulent Hyphomycete (Tuburcinia Scabies, Berk., Journ. Hort. Soc. Lond., vol. i. p. 33, tab. 4, figs. 30, 31), which gives a very peculiar appearance to the pustules, and to which indeed it is not confined, but occasionally forms a stratum a line or more in thickness beneath the greater portion of the cuticle. A few scattered tubers occur now and then affected by this disease, but it is very rarely so prevalent as to draw much attention. The potato-crops, however, suffered greatly from its ravages in the Scilly Islands and in Cornwall during the present summer, where it appeared under a very destructive form. Mature specimens were forwarded to me, with the promise at some future period of a supply of tubers in every stage of the disease. I was, however, disappointed in my hope of being enabled to investigate its nature more closely, possibly because the malady, as Martius reports, is several weeks in going through its phases. Indeed, it should seem that, in Germany, it does not usually occur till after the tubers have been raised for pitting; and as it first appears under the form of discoloured spots, which gradually spread and become confluent, and of which the cuticle is not at all ruptured for some weeks, it has been supposed by the German peasants to arise from injuries received by the tubers in the course of harvesting. This notion seems, however, to be completely contradicted by the fact of its occurring to a considerable extent on the tubers *in situ*.

The second disease which passes, though perfectly distinct, under the name of scab is extremely common in newly turned up soil, especially if it contain cinder-dust or lime rubbish, or

where these form a considerable part of the manure in old tilths, for it is by no means confined to new ground, but is to be found in a greater or less proportion in most crops, in some instances every individual tuber being attacked, in others the scabby tubers making the exception to the smooth and healthy appearance of the sample.

It commences at a very early stage in the growth of the tubers, whether in those produced immediately from the sets or those which often make their appearance with the first heavy rain after a long-continued drought. I have seen during the present autumn potatoes already attacked which did not exceed a quarter of an inch in diameter, and it is on these young tubers only that the early stage of the disease can be studied. Its first appearance is that of a minute brown speck, paler on the edge, and staining the subjacent cells of the cuticle, which, as is well known, consists of a variable number of layers of muriform tissue, and which should seem rather to be considered as the outer portion of the bark of the underground stem than as of the nature of epidermis. It is therefore only in a popular sense that it is here termed cuticle. The discolouration does not proceed beyond the cuticular cells, nor is the cuticle at all thickened, but is occasionally more or less corroded in the centre. Even in this early stage of growth, when the surface of the cuticle is still but little injured, and the disease confined to a discolouration of a few of the cells of which it is composed, on the removal of the outer coat little pale specks are visible on the smooth subjacent surface, indicating precisely the situation of the incipient pustules. In the course of a few days the spots spread, become paler, and are abraded in the centre; and if the cuticle is now torn off, it will be found that where the spots are situated it is protruded into the substance of the tuber, the subjacent cells being at the same time absorbed, so that the exposed surface of the tuber is covered with little pits of a paler colour than the rest, and more transparent, and, in red varieties, distinguished by the absence of colouring matter. If a section be made through the pits, the cells will be found to contain but little fecula, and their walls to change shortly to a reddish brown. The cells of the base of the pustule still form a portion of the cuticle, which has, however, been more or less incrassated as the outer layers of its tissue were corroded.

The pustules now become confluent and deeply excavated, their inner surface being more or less scaly and corroded. As long as the cuticle is easily separable they separate with it, whether fresh or boiled, so that the tubers, when served at table, appear shining and smooth if the cuticle is nicely peeled, the diseased spots being indicated by scars resembling those left by

the small-pox. The quality of the potato itself is little altered, except that it acquires sometimes a slightly earthy flavour, if indeed that is really attributable to the disease; and, according to the virulence of the disease, there is a slight difference in the quantity of fecula contained in the tubers. In this stage of growth it is not uncommon to find some species of Poduridæ revelling in the scurfy cavity of the pustules, and threads of a yellow-brown mycelium, which is probably that of *Botrytis vulgaris* or some nearly allied species, traversing it, but not penetrating far beneath the surface. These, however, are merely accidental and secondary phenomena in the malady.

By the time that the cuticle of the tubers has become well fixed, the spots, which are still more rough and excavated, often present a very unsightly appearance, but in every case, however complicated, a tissue very much resembling that of the cuticle is presented under the microscope; for, though the pustule has been excavated perhaps a line below the surface, and the original cuticle is seen surrounding the pustule, while the continuity between it and the cavity of the pustule which existed for some time after the appearance of the disease is quite dissolved, the whole of the diseased surface exhibits a muriform arrangement of the cells, those of all the strata of which it is composed being for the most part coterminous; the individual cells are, however, far larger and coarser. The manner in which these cells originate is very obscure, whether from a modification of the more superficial cells beneath the cuticle or from a hypertrophy of those of the cuticle itself: I am inclined, however, to the latter view, though it is not without difficulty, and the analogous case of cracked potatoes, which I was enabled to study, more partially indeed, at the same time, has made the matter at least doubtful.

After the summer drought and the subsequent rains, a crop of very smooth-skinned potatoes was much cracked from the inability of the tubers to accommodate the sudden increase of moisture. I was surprised to find, on examination, that these exhibited phases very similar to those of the scabby crop; the tissue beneath the cracks was transparent at first when cut, and nearly void of fecula, and became more rapidly rusty than the other parts of the tubers, and, what is of more importance, the disc of the fissures exhibited under the microscope the same muriform tissue, though here also the connexion between that and the cuticle was dissolved. I had no opportunity of ascertaining the condition of the tissue when the fissures first took place, which would probably have shown at once of which of the two sets of cells, the cuticular or sub-cuticular, it was a modification. In this instance I observed something which may perhaps indicate the mode in which the muriform tissue is formed. It will

be seen in fig. 4 that between two contiguous radiating series of cells a little wedge of cells has been interposed, of which the broad end consists of double, the narrower of single cells. This process repeated would clearly produce a tissue like that in question.

Fig. 1.

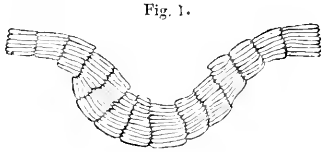


Fig. 2.

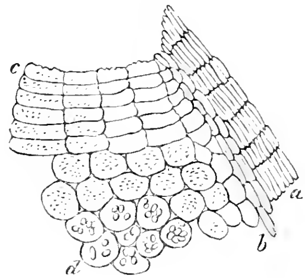


Fig. 3.

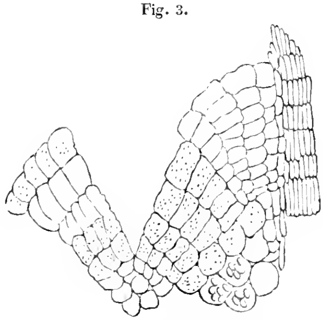


Fig. 4.

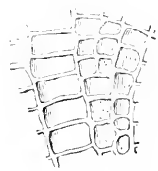


Fig. 1. Vertical section of a young pustule, showing that the structure of the pustule is the same as that of the skin of the tuber.

Fig. 2. Vertical section of an old pustule. *a*. Skin of tuber; *b*. Cells immediately beneath the skin, containing colouring matter; *c*. Cells at the base of the pustule; *d*. Starch cells.

Fig. 3. Vertical section of a cracked tuber through the centre of a fissure.

Fig. 4. Portion from the tissue at base of a crack more highly magnified.

In the case of cracking, the evil is evidently mechanical; and as the phases, as far as they have been observed, are so extremely like those of the disease we have been considering, I am inclined to think that that is in great measure mechanical also. The first decay of the tissue, which is confined to a mere speck, is probably caused by contact with some irritating particle in the soil, and when this is established, the corrosion of minute insects and the exposure of the tissue to external agents, accompanied by a constant effort to repair the damage, may be sufficient to account for it, for the disease is absolutely confined to the surface, and never penetrates to such a depth as to cause any general disarrangement of the tissues.

If such be a correct view of the case, which is submitted to further investigation, the remedy will consist in avoiding all

such substances in the cultivation of potatoes as are observed to be accompanied by scab. This will be best ascertained by the practical agriculturist, and would probably not be very difficult if care be taken not to confound the two very distinct diseases which pass under the common name of scab.

King's Cliff, November 18, 1847.

X.—*Observations upon the best methods of Packing Seeds for a voyage to India or China.* By Robert Fortune.

(Received October 27, 1847.)

When I was about to leave England for China in the spring of 1843, I was desired by the Council of the Horticultural Society to procure a quantity of seeds, and to have them put up in different ways, in order to test the best methods of packing such things for a long sea voyage to a distant country. Messrs. Wrench and Sons, of London-Bridge, supplied a large portion of the seeds, the remainder were made up in the garden of the Horticultural Society. In order to make the experiments as complete and satisfactory as possible, the same kinds of seeds and from the same samples were packed in three different ways. One lot was put up in bottles and sealed; a second was packed in paper and put into a box lined with tin; and a third was merely put in paper, and thrown loosely into a canvas bag to be hung up in my cabin. When I arrived at Hong-Kong, Messrs. Dent and Co. kindly placed their garden at my service for any experiments of this nature which it might be necessary to try. It was in the month of July, and the rays of the sun were too fierce, and the ground too dry, for the purposes of securing a crop; but a certain portion of the seeds was immediately unpacked and sown for experiment in a corner of the garden which was partially shaded by the house.

On examining the seeds in the sealed bottles, I observed that many of them were moist and mouldy; in some instances they appeared to have swelled to a certain extent, as if vegetation had been commencing; in other bottles they were perfectly dry, and seemed in good condition. The results were as may be expected; those seeds which were taken out of the mouldy samples all failed to vegetate, while the others came up well enough. Although I think the system of sending out seeds in sealed bottles is a bad one and ought never to be adopted, yet they might be sent out in this way in good order, provided the air in the bottles was well dried, and the seeds also, before being packed. But it is a difficult matter to dry thoroughly certain kinds of seeds which contain a large quantity of albumen. In

the passage to India, China, or Australia, the temperature is often changed; at one period the seeds are broiling in a high temperature under the line, a few days afterwards they are in a cold damp atmosphere, when the vessel is running down her "easting" far to the south of the Cape of Good Hope. In the case of India and China, the seeds again cross the line before they arrive at their destination. When in a high temperature, every particle of moisture is drawn out from the seeds into the bottles, which become little stoves or Ward's Cases for the time, and in which the first stage of germination commences. Other circumstances, however, are not favourable, and the vessel in the mean time sails onward in her course towards colder latitudes, vegetation is checked, a mouldiness ensues, and the vital principle of the seeds becomes extinct. This is what really takes place when seeds are packed in sealed bottles not perfectly dry, and, as this system of packing has no advantages which I know of, it is much better never to adopt it.

Those seeds which were taken out in boxes lined with tin were nearly all in good condition; so were those which were packed loosely in a canvas bag and suspended in the cabin. I have already said that the season at Hong-Kong, when I arrived there, was too hot for English seeds. After sowing a few for the purpose of experiment, the remainder were taken to Chusan and the other northern ports which I visited at that time. Dr. Maxwell, of the Madras army, had a small garden on the island of Chusan, which he rented from the Chinese. Here a great many of the seeds were sown, and the results as regards their vegetation were the same as I have already related, and confirmed the experiments made under unfavourable circumstances at Hong-Kong. But the climate of Chusan being much more favourable to European seeds, they not only vegetated, but grew afterwards with great luxuriance.*

* The natives, who had never seen any peas but the common field kinds, were much surprised at the growth of our English ones, which in this favoured climate attained a much greater size than they do at home. As the stems grew in height, the Chinese, with their characteristic conceit, told us that their own kinds were much better than ours, for that ours would produce nothing but stems and leaves. But when, in due course, the fine tall rows were covered with a sheet of white bloom, and when the large pods began to swell, the Chinese were fain to beg a portion of the produce to sow in their own gardens. These, with many other seeds, were given to them with much pleasure, and it is hoped are now cultivated to some extent—unless, indeed, they have been destroyed as belonging to the "barbarian," at the time the comfortable houses and hospitals were pulled down, which were left in good condition by the English when the island was restored in the spring of 1846. It is a curious fact that the moment the place was evacuated the Chinese began to pull down the houses erected at considerable expense by the English during their residence on the island.

Each of these two modes of packing has its peculiar advantages. Seeds, of course, can be packed more securely in tin for a long voyage, but when this mode is adopted they should be carefully dried, as well as the paper in which they are put up, before the box is closed. The method of packing in canvas bags, which are hung in a cabin or other airy part of the vessel, is the best of all, because any moisture which may evaporate from the seeds or paper during the voyage can readily pass into the air. But it is often difficult to induce captains of ships or others to allow packages of this kind to be swinging about in cabins, and unless some one can be got to take charge of them who can be depended upon, I should prefer the mode of drying the seeds well and packing them in a box lined with tin.

Another matter of equal importance as regards success is the age of the seeds. Old seeds in many instances are almost sure to fail. Even in this country, where seeds can be kept in the most favourable circumstances, many will not vegetate the second year. In sending them to distant countries, therefore, where they will have to pass through many changes of temperature, none but those of the last gathering should be sent. The Honourable East India Company, with that enlightened liberality which does them so much credit, kept up a large establishment at Calcutta for the purpose of procuring and sending the natural productions of India to England. For many years scarcely any of the seeds thus sent would vegetate when they reached this country. At last the reason of this want of success was solved. A young man from the Calcutta garden having been sent over to England for the purposes of improvement, was asked to explain the method of preparing these seeds for exportation. It came out that seeds were gathered year after year and stored in the same drawers; that, in fact, the young seeds were always mixed with the old ones which remained from former gatherings. When parcels were ordered to be made up for Europe these drawers were opened and the seeds taken out of them. Of course the packages so made contained a great portion of seeds which had been gathered years before, and whose vitality was much weakened or altogether gone.

Before seeds are packed for foreign countries, they should always be looked over, and those infested with insects carefully removed. These little animals make sad havoc amongst a packet of seeds during a long voyage.

From what I have stated it will be observed that the length of the voyage, the dampness of sea-air, the variations of temperature, and the attacks of insects, are the greatest difficulties we have to contend with in the exportations of seeds to distant countries. These, however, may be in a great measure overcome by

attending to the directions I have given for the preparation of the seeds. I may mention that by far the best way of sending small boxes of seeds to India or China is by the overland route, viâ Southampton. The expense of sending any box of small dimensions—say a foot, or a foot and a half, cubic measurement—by this conveyance will be less than its freight would be if sent by ship round the Cape; it will reach its destination in half the time, and the variations of temperature will be less. The post-office can also be used with great advantage in sending out small packets of the choicer kinds of seeds, and there is no plan which is more likely to be successful than sending them in a letter. A letter weighing an ounce will only cost two shillings, and may be made to hold a great number of interesting seeds for which a friend in the East would gladly give two gold mohrs; and if, in conclusion, I might give a word of advice to those who have friends in distant countries as to the kinds of flower-seeds which will prove most acceptable, I would say, send above all those common things which, from time immemorial, have been favourites in our woods and gardens. They will be prized much more than any thing which we consider new or rare. A friend of mine, who has a garden in one of the northern Chinese towns, and to whom I sometimes send plants and seeds, writes thus:—"Send me some Roses of various colours, but amongst them a plant or two of those *friends of my youth*, the Cabbage and Moss."

XI.—*Some Account of the "Black Prince Hamburgh" Grape.* By John Williams, of Pitmaston, C.M.H.S.

(Communicated Oct. 13, 1847.)

I HAVE desired my gardener to send you a bunch of a seedling vine, I raised from a berry of what is usually called the Black Hamburgh Grape, but I believe it really to be what Speechley describes as the Red Hamburgh, or Warner Grape, the berry of which is black when properly ripened. The cross was obtained by impregnation with the pollen of the "Black Prince," which I consider, after more than forty years' experience, to be one of the best grapes we have—not of the perfumed kind. The only defect I find in the Black Prince is that the berries grow too much crowded, and require so much thinning.

I therefore wedded it to the Hamburgh, with a view of obtaining a more loose open bunch, with the vinous acidity and richness of the Black Prince. This double object, I think, I have obtained. The seedling plants, for I raised several of the

same cross, grew the first year in pots, with artificial heat, but were then turned out into the open ground without being trained to a wall. Here they remained, and the annual shoots cut down to one of two eyes, till I found the end of the summer shoots and the cultivated appearance of the leaves began to throw out tendrils with a few flowers. Cuttings were then taken from the flowering end of the shoots, and planted against a south wall. They came into bearing soon after this, and one or two of the most promising were two years ago planted in my vinery. But the wood produced, till this year, was small; now it is become more vigorous and strong. It ripens earlier than the Hamburgh, and colours with less heat and light. The plant from which I gathered the bunch you will receive was planted at the east end of a lean-to-roofed house, and only got a little morning sun, and that but for a short period, owing to the shade of a large willow tree. It had no top sun-light from the roof glass, being under the shade of a rafter vine. You can therefore not judge what the flavour will be under these disadvantages. I expect the bunch and berry will be double its present size when trained under the roof glass, and the wood becomes strong.

We have had the coldest and most cloudy season I ever remember for the vines on the open walls. Still I think my new seedling varieties will ripen, if we have no severe frosts before the end of the month. I have named the new variety the "Black Prince Hamburgh."

Pitmaston, near Worcester, Oct. 13, 1847.

Note by Mr. Thompson.—The grape in question is a seedling, raised between the Black Hamburgh, which was the female parent, and the Black Prince.

The bunch weighed 1 lb. 3 oz. It was loosely formed, with long shoulders; and long, rather slender, pedicels. The berries are oval, being about nine-tenths of an inch in diameter from the insertion of the stalk to the opposite end; and eight-tenths in the transverse direction. The colour is a blue-black; in this respect resembling the Black Prince more than its female parent. The juice is more purple than that of the Hamburgh, and is sugary and rich. Seeds, two or three in each berry. The variety deserves to be propagated.

Oct. 21, 1847.

XII.—*Account of Experiments made in the Garden of the Horticultural Society, in* 1847, *with reference to the Potato Disease.* By Robert Thompson.

(Nov. 15, 1847.)

VARIOUS remedies having been suggested for the mysterious disease which has so extensively affected the potato crop, it was resolved that a number of experiments should be made, in order to try the efficacy of these proposed remedies, in the Garden of the Society.

A piece of ground was accordingly appropriated of as uniform quality as possible. It formed a parallelogram, 32 feet wide, open to sun and air, and was not manured.

In the experiments of which the results are given in Table I., the sets, cut tubers, were uniformly planted in rows across the above-mentioned compartment, the rows being 2 feet 4 inches apart, and running in the direction of north and south. The sets were planted 7 inches deep, and 8 inches from plant to plant in the rows. The variety of potato employed was the Jersey Blue, excepting for rows 11 and 12, in which young tubers of the Ash-leaved Kidney were planted; and the two half rows Nos. 37 and 38 were planted with the Cornish Kidney, the sets of the Jersey Blues having been exhausted. The following are the particulars of the respective experiments:—

1. *Lime and Charcoal.*—The results are given in Table I., Nos. 1, 2, 3. The quantities for the 3 rows were 1 bushel of lime, and $\frac{1}{20}$ bushel of powdered charcoal, mixed and scattered along the drills previously to planting the sets. This mixture was at the rate of 194 bushels of lime and between 9 and 10 bushels of charcoal per acre. The average sound produce of these three rows exceeded that of the adjoining three, to which nothing was applied, by 3 tons 13 cwt. 55 lbs. per acre. This surplus, it will be observed by referring to the table of results, is entirely owing to the enormous produce of the first of the three rows to which the mixture of lime and charcoal was applied, for the produce of the other two is below the average. In these the produce of sound tubers is respectively at the rate of 12 tons 18 cwt. 91 lbs. and 11 tons 7 cwt. 63 lbs. per acre; whilst that of row No. 1 is 20 tons 4 cwt. 110 lbs. This difference of produce cannot be ascribed to the mixture applied, for of this each row had an equal share. It can only be accounted for by the circumstance of the row No. 1 being at the outside, running parallel with a gravel walk, in consequence of which the foliage had more light and air, with full exposure to the afternoon sun. It is further worthy of remark, that whilst this

TABLE I.—RESULTS of EXPERIMENTS with JERSEY BLUE POTATOES planted in rows 32 ft. long, 2 ft. 4 in. apart, 7 in. deep, 8 in. from plant to plant, cut sets being employed.

DIVISION I.

	SUBSTANCES EMPLOYED.	No. of Tubers Sound.	No. of Tubers Diseased.	Weight of Tubers Sound.		Weight of Tubers Diseased.		Estimated Rate of Produce per Acre. Sound.			Estimated Rate of Produce per Acre. Diseased.			Rate per Cent. Diseased.
				lbs.	oz.	lbs.	oz.	Tns.	cwt.	lbs.	Tns.	cwt.	lbs.	
1	Lime and charcoal . . .	202	27	77	12	12	1	20	4	110	3	2	92	13·24
2	Do. do. . . .	172	35	49	11	12	15	12	18	91	3	7	43	20 66
3	Do. do. . . .	147	29	43	11	9	12	11	7	63	2	10	87	18·24
	Average of the above three rows	173	30	57	$0\frac{2}{3}$	11	$9\frac{1}{3}$	14	17	13	3	0	36	17·38
4	*Nothing*	172	41	44	12	11	13	11	13	10	3	1	59	20·88
5	Do.	143	53	38	14	16	3	10	2	45	4	4	35	29·40
6	Do.	156	34	45	3	12	11	11	15	43	3	6	10	21·92
	Average of the above three rows	157	42	42	15	13	9	11	3	70	3	10	72	24 06
7	Salt, lime, and charcoal . .	150	57	36	15	16	11	9	12	35	4	6	103	31·05
8	Do. do. . . .	174	48	38	10	15	9	10	1	21	4	1	3	22·81
9	Do. do. . . .	111	37	45	0	7	3	11	14	45	1	17	38	13·77
	Average of the above three rows	145	47	40	3	13	$2\frac{1}{3}$	10	9	33	3	8	48	22·54
10	*Nothing*	202	54	67	6	20	2	17	10	105	5	4	92	23·00
11 12	Ash leaved kidney, young tubers grown in 1837 planted .	113	10	6	4	1	8	0	16	40	0	7	90	24·00
13	*Nothing*	193	19	73	4	6	13	19	1	61	1	15	54	8·50
14	Watered with weak chloride of lime	180	32	37	3	7	11	9	13	78	2	0	4	17·52
15	Do. do. . . .	143	37	34	0	8	2	8	17	11	2	2	35	19·28
16	*Nothing*	109	47	27	0	13	0	7	0	71	3	7	80	32·50
17	Salt, potash, and fat . . .	187	24	50	8	7	0	13	3	5	1	16	51	12·17
18	Sulphuric acid, diluted (half row) .	77	4	15	15	0	14	8	6	4	0	9	12	5·19
19	Powdered charcoal (half row) .	80	5	19	6	1	10	10	1	92	0	16	102	7·73
20	Salt	195	8	42	0	1	11	10	18	86	0	9	12	3·86
21	Coal-tar sprinkled over the sets .	127	10	26	0	1	0	6	15	48	0	5	23	3·70
22	*Nothing*	144	14	40	5	2	14	10	9	110	0	14	108	6 65
23	Chalk, salt, and charcoal . .	150	7	34	13	1	10	9	1	37	0	8	51	4·45
24	Do. do. . . .	170	8	31	4	2	5	8	2	86	0	12	4	6·89
	Average of the above two rows	160	$7\frac{1}{2}$	33	$0\frac{1}{2}$	1	$15\frac{1}{2}$	8	12	6	0	10	27	5·67
25	Sulphate of soda and nitrate of soda	170	23	34	4	5	14	8	18	44	1	10	67	14·64
26	Salt successively applied . .	160	16	32	11	2	4	8	10	29	0	11	79	6·44
27	Do. do. . . .	184	12	37	0	3	0	9	12	81	0	15	70	7·50
	Average of the above two rows	172	14	34	13	2	10	9	1	55	0	13	74	6·97
28	Sulphur	190	11	36	0	2	5	9	7	58	0	12	4	6 03
20	Salt and sulphate of magnesia .	165	16	33	8	3	$7\frac{1}{2}$	8	14	55	0	18	7	9·38
30	Do. do. . . .	188	16	36	15	2	15	9	12	35	0	15	33	7·36
	Average of the above two rows	176	16	35	$3\frac{1}{2}$	3	$3\frac{1}{4}$	9	3	45	0	16	76	8·37
31	Moberly's sulphate of magnesia .	166	26	34	0	4	12	8	17	11	1	4	82	12·26
32	Sets dipped in lime . . .	148	14	33	11	2	13	8	15	53	0	14	72	7·70
33	Sets sprinkled with quick-lime .	148	25	35	2	7	5	9	2	107	1	18	9	17·27
34	Soot	163	28	34	9	6	11	9	0	3	1	15	93	16·21
35	Oil-cake (half row) . . .	77	8	24	8	2	8	12	15	25	1	6	5	9·23
36	*Nothing* (half row) . . .	80	10	23	8	3	1	12	4	91	1	11	100	11·52
37	Powdered charcoal (half row) .	137	18	20	4	2	14	10	10	107	1	9	106	12·43
38	*Nothing* (half row) . . .	114	16	15	15	2	12	8	5	108	1	8	70	14·71

DIVISION II.

39	Sets dipped in boiling-water .	166	23	56	15	6	11	14	16	55	1	14	93	7·39
40	Sets dipped in lime and dung-water	120	9	31	0	4	3	8	1	53	1	1	90	11·90
41	Do. do. . . .	160	26	44	9	7	14	11	12	13	2	1	1	15·02
42	Do. do. . . .	190	30	57	14	6	2	15	1	51	1	13	56	8 94
43	Planted alternately with beans .	120	21	48	8	5	10	10	16	18	1	8	145	11·90
44	Crushed oil-seed (half row) . .	82	13	26	2	3	1	13	12	16	1	11	100	10·51
45	*Nothing* (half row) . . .	91	11	29	12	1	13	15	9	102	0	18	98	5·74
46	Powdered oil cake (half row) .	86	3	22	8	6	13	11	16	110	0	8	52	3·48
47	*Nothing* (half row) . . .	109	7	30	6	2	12	14	16	48	1	8	70	8·30
48	Shaded by Indian corn . .	140	32	43	5	7	2	11	5	68	1	17	11	14 12
	Average of all the rows to which *Nothing* was applied . .	168	34	48	$\frac{3}{5}$	10	$5\frac{7}{10}$	12	12	55	2	16	48	18·11

outside row produced at the rate of 20 tons per acre of sound tubers, the proportion diseased was nearly 11 per cent. less than in the rows adjoining, to which nothing was applied. In the rows Nos. 2 and 3 the per centage of diseased tubers was above the average.

The rows 4, 5, 6 had *nothing* applied. Their produce was diseased to the extent of 24 per cent.; still, the quantity of sound tubers amounted to 11 tons 3 cwt. 70 lbs., which is a fair crop.

Salt, Lime, and Charcoal.—The results are given, Nos. 7, 8, 9, Table I. The quantities employed were, salt 3 lbs., lime 1 bushel, and charcoal, powdered, $\frac{1}{20}$ bushel to 3 rows, or 5 cwt. 23 lbs. salt per acre, the quantities of lime and charcoal being the same as were employed for the rows 1, 2, 3, and applied in the same way; but the salt was scattered over the ground previously to cutting out the drills for the sets, in order that it might be mixed with the soil; in fact, this experiment differed only from the first as regards the salt; and it appears by the results Nos. 7, 8, 9, and their average, that the salt had not proved a beneficial addition. In the beginning of July it was observed that in these three rows the stems and foliage were of a paler green than in those adjoining. The average produce of sound tubers was at the rate of 10 tons 9 cwt. 33 lbs., being less by 2 tons 3 cwt. 22 lbs. than the average of sound produce in the rows to which nothing was applied. The portion diseased was 4 per cent. above the average, and 5 per cent. in excess of that where only lime and charcoal were employed.

To row 10 *nothing* was applied. The total produce was at the rate of 22 tons 15 cwt. 85 lbs. per acre, of which 17 tons 10 cwt. 105 lbs. was the proportion sound, nearly one-third above the average.

Young tubers of the Ash-leaved Kidney were planted in rows 11 and 12. Hot weather and the excitability induced by the disease occasioned premature vegetation in many of the tubers produced by plants of early potatoes grown in the kitchen garden in the summer of 1846. Instead of remaining dormant till the following spring, they pushed stems above ground the same autumn. Some of these young plants were taken up before frost and planted in a frame, where they formed tubers early in 1847; but these were of an imperfect character, evincing a strong disposition to send out runners, as is the case with some wild potatoes. Disease likewise appeared amongst them at an early stage of their growth. They were then taken up, and the soundest exposed to light till the time of planting in the open ground. The two rows 11 and 12 were planted with these tubers, a generation younger than those usually planted. Many of them failed

to vegetate. The produce of sound tubers was small, only 15 cwt. 70 lbs. per acre; and of the total produce 24 per cent. was diseased.

Row 13, *Nothing.* The produce was still greater than that of row 10. The amount of sound produce was greater than that of any row in the compartment, with the exception of No. 1, the *outside* row next the gravel walk. Nos. 10 and 13 were not outside rows; but the plants of the Ash-leaved Kidney in the two intervening rows were thin, dwarf, and decayed early, leaving an open space, which doubtless proved beneficial to their naturally strong-growing neighbours, the Jersey Blues, in rows 10 and 13. The former of these rows, situated on the west side of the space, was consequently exposed to the morning sun, and of its large produce 23 per cent. was diseased. No. 13 was equally exposed to the afternoon sun, and only $8\frac{1}{2}$ per cent. was diseased, leaving the unusually large quantity, estimated per acre of 19 tons, sound.

Chloride of Lime.—Table I. 14, 15. In this experiment the sets, placed in the drills 7 inches deep, were covered to the depth of 4 inches, and the soil over them was then watered with a weak solution of chloride of lime. The quantity was 2 oz. chloride in 8 gallons of water, to a row, being at the rate of 72 lbs. of chloride of lime to an acre. The produce was below the average; and the portion diseased averaged above 18 per cent., or about as much as that of the rows to which nothing was applied.

Row 16, *Nothing.*—This proved a bad row as regards both quantity and quality of produce. The sound portion was at the rate of more than 5 tons per acre below the average of that of all the rows to which nothing was given; and the quantity diseased amounted to $32\frac{1}{2}$ per cent. This row was next an experiment made by planting sets in hills, and then layering the stems, in consequence of which the tops extended in a horizontal direction and approached those of the row in question, although the sets in the hills were more than the usual distance from those in the row. The shading thus occasioned to the latter may have deteriorated its produce.

Salt, Potash, Fat, and Water, mixed so as to form a thin, gelatinous, soapy mass, was applied to sets planted in hills, as will be hereafter detailed. One row, No. 17, was however planted in drills like those from which the results are given in Table I., and half a pint of the above compound was poured over each set when placed in the drill.

The sound produce was somewhat above the average, and the portion diseased was 6 per cent. less than in the rows which had nothing.

Sulphuric Acid.—Table I. 18. Half a row was watered over

the tops June 18th with $\frac{1}{8}$ pint of sulphuric acid diluted with 25 pints of water. The produce was below the average, but the diseased portion amounted to little more than 5 per cent.

Charcoal, powdered.—Table I. 19. As soon as the plants were all fairly above ground, powdered charcoal to the amount of 2 lbs. 4 oz., was applied to half a row, being at the rate of 1 ton 8 cwt. 72 lbs. to an acre. The soil was removed from the stems to the depth of 2 inches, and as far as 6 inches from each side of the plants. To this extent the charcoal was equally scattered, a portion being closely in contact with the stems; it was then covered with the soil. The produce was below the average, but the portion diseased was little more than 7 per cent., nearly 10 per cent. less than that of the average of rows to which nothing was given. It must, however, be observed that some of those rows to which nothing was applied (see Table I. 22, 45, and 47) were even less diseased than in this to which the above quantity of charcoal was given.

Salt.—Table I. 20. Common salt, $2\frac{1}{2}$ lbs. to the row, being at the rate of 13 cwt. per acre, was mixed with the soil previously to planting. In the experiment with salt, lime, and charcoal, it was remarked that the stems and leaves were of a paler green than those in the adjoining rows where salt had not been applied. The same observation has to be made as regards the colour of the stems and leaves in this experiment; and the plants also exhibited a somewhat dwarfer habit of growth. The amount of sound produce was at the rate of 1 ton 13 cwt. 81 lbs. per acre below the average of those rows to which nothing was applied; but the quantity diseased was very small, being scarcely 4 per cent., and this is less than in any of the returns in Table I., with the exception of the following:—

Coal-tar sprinkled over the sets.—Table I. 21. In this experiment, the sets when placed in the drills were sprinkled with coal-tar by means of twigs, which were dipped in it and shaken over the sets. Of course some would fall on the soil in the drill, as well as on the potato sets. The quantity employed was 1 quart of coal-tar to a row, being at the rate of 146 gallons per acre. The stems were somewhat dwarfer than the generality of those in the compartment. The sound produce was 5 tons 17 cwt. 7 lbs. less than that of the average of rows which had nothing. Whether entirely owing to the coal-tar or not, it deserves to be remarked that in this row there was less diseased produce than in any other of which the results are given in Table I., the proportion being only $3\frac{7}{10}$ per cent.

Nothing.—Table I. 22. In this row the diseased portion per cent. was little more than one-third of the average quantity in rows which had nothing.

Chalk, Salt, and Charcoal.—Table I. 23, 24. For these two rows ½ bushel of chalk was powdered, then thoroughly mixed with 1 lb. of common salt, being at the rate of 146 bushels of chalk and 2 cwt. of salt per acre. The salt and charcoal were mixed with the soil previously to cutting out the drills. Powdered charcoal to the depth of half an inch was put in the bottoms of the drills, and on it the sets were placed. The quantity of charcoal afforded was at the rate of 110 bushels per acre. The growing foliage was paler than usual, like that of some rows already noticed to which salt had been applied. The average amount of sound produce from these two rows was at the rate per acre of 1 ton 16 cwt. 104 lbs. less than that of No. 22, the row next to them, which had nothing; but the quantity diseased was nearly 12½ per cent. less than that of all the rows having nothing. On the other hand, No. 22, one of the rows which had nothing, was less diseased than one of those to which the chalk, salt, and charcoal were applied, and this was the adjoining row.

Sulphate of Soda and Nitrate of Soda.—Table I. 25. These substances were given as a top dressing. The quantities were 3 oz. of each to a row, being at the rate of 110 lbs. of sulphate of soda and 110 lbs. of nitrate of soda to an acre. These were mixed and scattered on the surface of the ground when the plants were 6 inches high, care being taken to prevent the salts coming in immediate contact with the stems and foliage. The quantity of diseased produce was considerably greater than in the adjoining rows. It was 7¾ per cent. more than in the row next on the west, treated with chalk, salt, and charcoal, and fully 8 per cent. more than in the row next on the east side, to which salt was applied.

Salt successively applied.—Table I. 26, 27.

1. Common salt was mixed with the soil before planting, ½ lb. to a row.
2. Common salt in solution with water was distributed on the ground by means of a watering-pot, after the potatoes had been planted a week, the quantity being ½ lb. to a row.
3. Another ½ lb. of common salt was given as a top dressing, scattered by hand on the surface of the ground, when the plants were 6 to 8 inches high, just before the earthing up.

The quantity of salt applied as above was at the rate of 2 cwt. 76 lbs. per acre each dressing, the whole amounting to 7 cwt. 89 lbs. per acre. The quantity diseased averaged nearly 7 per cent., not half so much as in the row adjoining to which sulphate of soda and nitrate of soda were given.

Sulphur.—Table I. 28. Flowers of sulphur, 4 oz. to a row, was scattered over the plants when they were 8 inches high.

This application was at the rate of 146 lbs. per acre. About 6 per cent. was diseased.

Salt and Moberly's Sulphate of Magnesia.—Table I. 29, 30. For this experiment a compost was employed, consisting of ½ lb. of common salt, ½ lb. of Moberly's sulphate of magnesia, mixed with 11 lbs. of earth, for 1 row. Moberly's sulphate of magnesia is a rough sulphate from the alum works near Whitby; its crystals are large, and form rhombic prisms, whereas the common sulphate of magnesia crystallizes in small quadrangular prisms. This rough sulphate is found to contain a little free sulphuric acid. The above compost was put in the drills as manure, and then watered with 3 gallons of manure-water, distributed by means of a watering-pot. As soon as the manure-water had soaked in, the potato-sets were planted on the compost. The rates per acre of the application of the respective ingredients were, common salt 2 cwt. 68 lbs., Moberly's sulphate of magnesia 2 cwt. 68 lbs., earth 2 tons 17 cwt. 29 lbs., manure-water 1650 gallons. The amount of sound produce was nearly 2 cwt. per acre greater than where salt alone was successively applied to rows Nos. 26, 27; but the proportion diseased was nearly 1½ per cent. more than in those rows.

Moberly's Sulphate of Magnesia.—Table I. 31. The quantity was ½ lb. mixed with the soil when the potato-sets were planted, being at the rate of 2 cwt. 68 lbs. per acre. The produce, estimated per acre, was 6 cwt. 34 lbs. less than in the preceding experiment. This may have been owing to the absence of the earth and manure-water. It was observed that, where salt and sulphate of magnesia were applied, the proportion diseased was nearly 1½ per cent. greater than where salt had been successively applied. In all the rows to which salt alone was given, the diseased portion averaged scarcely 6 per cent. In this row, to which Moberly's sulphate of magnesia only was applied, the proportion diseased was 12¼ per cent., or more than double that of the rows which had common salt.

Sets dipped in Lime.—Table I. 32. The sets were dipped in hot slaked lime, and were then planted with all the lime that adhered to them. The proportion diseased was $7\frac{7}{10}$ per cent.,—not half the quantity diseased in the next row, where the sets were merely sprinkled with lime.

Sets sprinkled with Lime.—Table I. 33. The sets being placed in the drill, powdered unslaked lime was dusted over them. The quantity was 2 lbs. to the row, being at the rate of 10 cwt. 46 lbs. per acre. The very large proportion of 17·27 per cent. was diseased. More lime was used than in the preceding experiment. When the sets in both rows were about to be covered up, there was quite as much lime visible upon the

sets in the one row as upon those of the other; but there was this difference: the sets being planted with the eyes uppermost, cut sides were, of course, undermost, and these would not be reached by the lime when sprinkled over the sets; but in the case of dipping the sets, the cut surfaces, on the contrary, would take on a large coating of lime, owing to their moisture.

Soot.—Table I. 34. The potato-sets being placed, soot was scattered over them, and along the bottom of the drill, in quantity about 3 quarts to a row. Estimated per acre, this amounts to $54\frac{1}{2}$ bushels. The produce was diseased to the amount of $16\frac{1}{5}$ per cent., nearly 5 per cent. more than that of the adjoining row, which had nothing.

Powdered Oil-cake.—Table I. 35. This was scattered in the drill as manure, at the rate of 1 lb. 9 oz. to half a row, the estimated quantity per acre being 16 cwt. 30 lbs. The sound produce was at the rate of 10 cwt. 46 lbs. per acre more than that of the other half of the row to which nothing was given; and where the oil-cake was employed, the proportion diseased was 2·29 per cent. less than in the part of the row where it was not employed.

Powdered Charcoal.—Table I. 57. The quantity of 2 lbs. 4 oz. to half a row was put in the drills about the sets, being at the rate of 2 tons 3 cwt. 48 lbs. per acre. This half row, as regards the quantity and quality of its produce, can only be compared with the other half of the same row to which nothing was applied, because a different variety of potato was employed for sets,—the Cornish Kidney, instead of the Jersey Blues, these being exhausted. The sound produce was about $2\frac{1}{4}$ tons more per acre than in the half of the row to which powdered charcoal was not applied, and the diseased proportion was $2\frac{1}{4}$ per cent. less.

The remaining results in Table I. were derived from sets of the Jersey Blue Potatoes planted in another division of the compartment. The soil was considered of similar quality to that in which the preceding experiments were conducted.

Sets dipped in boiling Water.—Table I. 39. The sets, just before planting, were dipped hastily in boiling water. The sound produce was above the average, and the proportion diseased was below the average, amounting to little more than 7 per cent.

Sets dipped in a mixture of Lime and Dung-water.—Table I. 40, 41, 42. Some lime was slaked and allowed to cool. Dung-water was added to form a mixture of the consistence of thick cream; into this mixture the sets were dipped, and, when dry, they were planted. It will be seen, by inspecting the Table, that the produce of the respective rows varied much as regards the quantity sound and the proportion diseased; the latter from nearly 9 to 15 per cent. Row 42 gave the greatest amount of sound produce with the least proportion diseased.

It is necessary to observe that this row had not a row of potatoes next to it on one side, but a row of Mazagan beans.

Beans planted with the Potatoes.—Table I. 43. At the distance of 2 feet 4 inches from the last row in the preceding experiment, a row of Mazagan beans was planted; 2 feet 4 inches from this a row of potato-sets and Mazagan beans alternately; and again, at the distance above-mentioned, another row of Mazagan beans only. In the row, planted alternately with potatoes and beans, the potato-sets were placed 16 inches apart instead of 8 inches, as in the previously detailed experiments; and between every two sets a Mazagan bean was sown. The proportion of produce diseased was nearly 12 per cent. Planting with beans, therefore, appears no effectual remedy against the potato disease; but the result of the experiment deserves notice in another point of view. Although planted at double the usual distance, only 24 plants of potatoes instead of 48 being in the row, the amount of sound produce was at the rate of 10 tons 16 cwt. 18 lbs. per acre. From sets planted at half the distance in the row without beans, 26 results out of 47 will be found in the Table, with less amount of sound produce than was afforded by the potato plants in this row, where they alternated with beans. Such being the case, the experiment of growing beans with potatoes certainly deserves extensive trial. The bean plants grew very well till attacked by insects, as was the case with this crop generally in the past summer, and to an extent that rendered it impossible to make any just estimate of their produce.

Crushed Oil-seed, the fresh seeds of "Gold of Pleasure," (*Camelina sativa*).—Table I. 44. This was scattered in the drill as manure previously to planting the sets, the quantity being the same as that of the powdered oil-cake already noticed, namely, 1 lb. 9 oz. to half a row; estimated quantity per acre, 10 cwt. 46 lbs. The result was not favourable, for the sound produce was less than that from the other half of the same row which had *nothing*, whilst the per-centage diseased was nearly double.

Powdered Oil-cake, from seeds of "Gold of Pleasure."—Table I. 46. This was applied in an equal quantity, and in the same manner as the crushed oil-seed in the preceding experiment. The sound produce was at the rate of 2 tons 19 cwt. 50 lbs. per acre below that from the other half of the same row to which *nothing* was applied; but the proportion diseased was the least that is indicated amongst all the results in Table I., being scarcely 3½ per cent.

Potato Plants shaded by Indian Corn.—Table I. 48. The Indian corn could not be planted in the compartment in which the preceding experiments were made, because its shade would have more or less affected adjacent rows not intended to be influenced by it. A row of potatoes was therefore planted in the

Kitchen Garden 32 feet in length, and a row of Indian corn was planted on each side of it at 2 feet distance. The result must be considered unfavourable, inasmuch as it appears that upwards of 14 per cent. of the produce was diseased.

Experiments with Jersey Blue Potatoes, planted in hills, with a composition of Potash, Fat, and common Salt, with Water.

For these experiments, the results of which are given in Tables II. III. and IV., a preparation was made of the above-mentioned substances, in the proportion of 20 lbs. of potash (the potash of commerce), 22 lbs. of common fat, 7 lbs. of common salt, and about 36 gallons of water. The potash was dissolved in rather more water than was sufficient to hold it in solution; the fat was then added, and the mixture frequently stirred till all the fat was acted upon by the potash. The rest of the water, holding in solution the common salt, was then added, and the compound frequently stirred until it thickened into a gelatinous mass.

TABLE II.—RESULTS of EXPERIMENTS with JERSEY BLUE POTATOES, planted whole, in hills, each hill occupying one square yard. Composition of potash, fat, common salt and water applied to the Sets; *Plants not earthed up.*

	Number of Tubers Sound.	Number of Tubers Diseased.	Weight of Tubers Sound.		Weight of Tubers Diseased.		Estimated Rate of Produce per Acre.						Rate per Cent. Diseased.
							Sound.			Diseased.			
			lbs.	oz.	lbs.	oz.	Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	
1	33	2	4	13	0	4	10	7	108	0	10	90	4·93
2	20	7	4	1	1	7	8	15	62	3	2	13	26·13
3	18	3	2	8	0	9	5	8	4	1	4	34	18·37
4	20	4	3	14	0	10	8	7	51	1	7	1	13·88
5	17	6	3	14	1	12	8	7	51	3	15	70	31·11
6	17	3	5	0	1	0	10	16	8	2	3	24	16·66
7	26	3	4	0	1	0	8	12	96	2	3	24	20·00
8	23	4	5	5	1	1	11	9	64	2	5	102	16·66
9	37	6	3	8	1	2	7	11	28	2	8	69	24·32
10	29	1	8	14	0	2	19	3	59	0	5	45	1·38
11	45	2	3	15	0	8	8	10	17	1	1	68	11·26
12	11	12	2	12	0	14	5	18	94	1	17	91	28·00
13	24	1	3	6	0	2	7	5	95	0	5	45	3·57
14	14	5	3	8	2	0	7	11	28	4	6	48	12·50
15	70	2	4	8	0	8	9	14	52	1	1	68	10·00
16	18	5	4	4	0	14	9	3	74	1	17	91	17·07
17	20	4	3	14	0	10	8	7	51	1	7	1	13·88
18	18	10	1	15	2	3	4	3	81	4	14	59	53·03
19	18	7	3	11	1	7	7	19	39	3	2	13	28·05
20	21	1	7	8	0	2	16	4	12	0	5	45	1·63
21	12	7	3	7	2	0	7	8	61	4	6	48	3·50
22	25	6	2	14	2	1	6	4	27	4	9	14	41·77
23	7	6	1	12	1	15	3	15	70	4	3	81	52·57
24	28	3	2	8	0	2	5	8	4	0	5	45	4·76
25	14	9	2	13	1	10	6	1	60	3	10	25	36·62
26	16	8	1	8	1	9	3	4	92	3	7	58	51·02
27	13	7	1	15	1	15	4	3	81	4	3	81	50·00
28	17	1	2	2	0	2	4	11	93	0	5	45	5·55
29	18	7	2	15	0	14	6	6	105	1	17	91	22·43
30	27	5	6	0	0	3	12	19	32	0	8	11	30·30
Average	22·8	4·9	3	12	1	0	8	2	86	2	4	12	21·32

In the meantime, the ground allotted was traced into square yards. At equal distances from the centre of each of these square yards of ground 2 whole potatoes were placed on the surface, 8 inches apart. Alleys a foot wide were then marked off in the direction of the lines by which the square yards were traced, and $\frac{1}{4}$ pint of the soapy gelatinous compound was poured on the sets in each square. They were covered with $3\frac{3}{4}$ inches of soil, by taking it 3 inches deep from the alleys. In this manner 90 hills were planted, each 2 feet square; but with the alleys the whole occupied 90 square yards.

The results obtained from hills 1 to 30 inclusive are given in Table II. In these hills the plants were not earthed up. With the exception of weeding, nothing was done to them from the time the tubers were planted and covered with between 3 and 4 inches of soil till the produce was taken up. In all these hills the produce was more or less diseased, in proportions varying from little more than 1 per cent. to 53 per cent. The average was about $21\frac{1}{3}$ per cent. The greatest amount of sound produce, estimated per acre, was 19 tons 3 cwt. 59 lbs., the least 3 tons 4 cwt. 92 lbs.

TABLE III.—RESULTS of EXPERIMENTS with JERSEY BLUE POTATOES, planted whole, in hills, each hill occupying one square yard. Composition of potash, fat, common salt and water applied to the Sets; *Plants once earthed up.*

	Number of Tubers Sound.	Number of Tubers Diseased.	Weight of Tubers Sound.		Weight of Tubers Diseased.		Estimated Rate of Produce per Acre. Sound.			Estimated Rate of Produce per Acre. Diseased.			Rate per Cent. Diseased.
			lbs.	oz.	lbs.	oz.	Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	
31	34	1	6	9	0	2	14	3	66	0	5	45	1·86
32	43	4	3	4	0	6	7	0	50	0	16	23	10·34
33	33	1	5	4	0	2	11	6	98	0	5	45	2·32
34	40	5	3	0	0	8	6	9	72	1	1	68	14·28
35	38	..	4	4	..		9	3	74		..		..
36	18	4	4	2	0	5	8	18	29	0	13	56	7·04
37	25	1	4	12	0	2	10	5	30	0	5	45	2·56
38	28	..	5	12	..		12	8	54		..		..
39	14	..	4	0	..		8	12	96		..		..
40	21	2	3	0	0	$1\frac{1}{2}$	6	9	72	0	4	5	3·03
41	14	..	2	12	..		5	18	94		..		..
42	20	..	3	15	..		8	10	17		..		..
43	19	..	4	11	..		10	2	63		..		..
44	26	2	4	3	0	6	9	0	107	0	16	23	8·21
45	23	..	5	11	..		12	5	87		..		..
Average	26 4	$1\cdot\frac{1}{3}$	4	5	0	2	9	7	91	0	5	94	3·20

Jersey Blue Potatoes, planted in hills and earthed up when 8 inches high; the application of the potash, fat, salt, and water composition being the same as in the preceding experiment. The results from these hills, 31 to 45, are given in Table III. There it will be observed that the plants in 7 out of the 15 hills had no diseased tubers, and that the average proportion diseased was

only $3\frac{1}{5}$ per cent., whereas in the preceding experiment, differing only from the one under consideration in the plants not being earthed up, the proportion diseased was upwards of 21 per cent. On the average, therefore, it would appear that the earthing up had diminished the amount of diseased produce fully 18 per cent., whilst the amount of sound produce was increased at the rate of 1 ton 5 cwt. 5 lbs. per acre.

TABLE IV.—RESULTS of EXPERIMENTS with JERSEY BLUE POTATOES, planted whole, in hills, each hill occupying one square yard. Composition of potash, fat, common salt and water applied to the Sets; *Plants layered and earthed-up repeatedly.*

	Number of Tubers Sound.	Number of Tubers Diseased.	Weight of Tubers Sound.		Weight of Tubers Diseased.		Estimated Rate of Produce per Acre.						Rate per Cent. Diseased.
							Sound.			Diseased.			
			lbs.	oz.	lbs.	oz.	Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	
46	24	..	4	5	..		9	6	40	..			..
47	24	..	3	10	..		7	16	73	..			..
48	12	..	2	2	..		4	11	93	..			..
49	28	..	3	12	..		8	2	6	..			..
50	21	1	2	12	0	$1\frac{1}{2}$	5	18	94	0	4	5	3·29
51	32	..	7	4	..		15	13	34	..			..
52	14	1	3	10	0	12	7	16	73	1	12	46	17·14
53	22	2	5	6	0	11	11	12	31	1	9	79	11·34
54	17	1	4	3	0	4	9	0	107	0	10	90	5·63
55	13	..	1	15	..		4	3	81	..			..
56	20	2	3	14	0	6	8	7	51	0	16	23	8·82
57	22	..	4	5	..		9	6	38	..			..
58	17	..	2	10	..		5	13	49	..			..
59	18	2	5	10	0	12	12	3	8	1	12	46	11·76
60	17	4	4	1	1	4	8	15	62	2	14	2	23·52
61	25	..	5	0	..		10	16	8	..			..
62	16	1	2	8	0	4	5	8	4	0	10	90	9·09
63	17	..	4	8	..		9	14	52	..			..
64	23	..	3	12	..		8	2	6	..			..
65	22	..	5	12	..		12	8	54	..			..
66	13	2	1	11	0	3	3	12	103	0	8	11	10 00
67	23	1	4	6	0	$1\frac{1}{2}$	9	9	7	0	4	5	2·00
68	27	1	5	10	0	2	12	3	8	0	5	45	2·17
69	18	..	3	9	..		7	13	106	..			..
70	17	..	3	9	..		7	13	106	..			..
71	18	..	3	14	..		8	7	51	..			..
72	18	2	3	8	0	3	7	11	28	0	8	11	5·08
73	18	..	5	1	..		10	18	86	..			..
74	22	1	3	10	0	2	7	16	73	0	5	45	3·33
75	23	3	2	11	0	13	5	16	15	1	15	12	23·21
76	16	4	2	2	0	11	4	11	93	1	9	79	24·44
77	16	..	4	3	..		9	0	107	..			..
78	25	..	4	1	..		8	15	62	..			..
79	13	..	4	15	..		10	13	41	..			..
80	35	..	6	14	..		14	17	10	..			..
81	17	..	3	2	..		6	15	5	..			..
82	20	1	5	9	0	$1\frac{1}{2}$	12	0	42	0	4	5	1·68
83	23	..	3	14	..		8	7	51	..			..
84	21	4	2	7	0	8	5	5	37	1	1	68	17 02
85	14	..	2	13	..		6	1	60	..			..
86	21	2	3	4	0	4	7	0	50	0	10	90	7·14
87	22	1	3	5	0	2	7	3	16	0	5	45	3·63
88	14	..	2	4	..		4	17	26	..			..
89	21	1	3	6	0	1	7	5	95	0	2	78	1·81
90	10	1	2	3	0	$1\frac{1}{2}$	4	14	59	0	4	5	4·10
Average .	19·8	0·8	3	$13\frac{1}{2}$	0	$2\frac{1}{4}$	8	6	1	0	7	49	4·28

Jersey Blue Potatoes planted in hills, the stems being layered and earthed up successively.—The results from hills 46 to 90 inclusive are given in Table IV. This differed from the preceding experiment in regard to layering the stems, and in their receiving two earthings up instead of one. Soil for this could not be dug from the alleys without interfering with the roots of the potatoes; it was therefore brought from another quarter. In 24 out of 45 hills the tubers were all sound, but the average quantity diseased was more, and the amount of sound produce less, than where earthing up, without layering, was performed at once.

A plot of ground was planted with potatoes in the Kitchen Garden in the same manner as regards the depth of sets, distance between the plants, and rows, as in the preceding experiments. The ground was in good condition; but had no manure when the potatoes were planted. The varieties were the Early Manly, Early Champion, and Cornish Kidney; cut tubers were employed for sets. The stems of all grew vigorously in the first instance; and in appearance the foliage was very healthy till the beginning of June. But at an early stage, when the plants were only a little above ground, it was found that the blanched part of the stems below ground was faintly tinged with brown. The tinge was at first quite superficial; but it deepened to a more rusty colour as the disease progressively effected the destruction of the tissue. Fungi of course soon began to lay hold of the dead matter. The spongioles were also affected; still the plants showed no signs of disease above ground till the beginning of June, as above mentioned. After this the youngest foliage appeared of too pale a green. In the middle of June blotches were observed on some of the leaves. On the 18th of June the following experiments were commenced: their results are given in Table V.

Sulphuric acid, more or less diluted with water, was applied to 6 contiguous rows of the Cornish Kidney, being distributed over the tops by means of a watering-pot. The degrees of dilution were as follow:—

1.	Sulphuric acid	1	part to	$12\frac{1}{2}$	parts of water, by measure.
2.	,,	1	,,	25	,,
3.	,,	1	,,	50	,,
4.	,,	1	,,	100	,,
5.	,,	1	,,	150	,,
6.	,,	1	,,	200	,,

The 6 rows to which the above were applied were each 22 feet in length.

Sulphuric acid 1 *part to* $12\frac{1}{2}$ *parts of water.*—Table V. 1. The quantity to a row was 2 pints of sulphuric acid in 25 pints of water. This, estimated per acre, amounts to 212 gallons of sulphuric acid, and 2650 gallons of water. It was of course

expected that the plants would be destroyed where touched by this strongest application; but the experiment was made in order to ascertain whether or not the whole plant would be destroyed; and if not, whether the roots would send up fresh shoots. In a few hours after the application, the foliage was mostly decomposed; the peduncles and young fructification entirely so. The calyces were reddened; and likewise in some instances the foliaceous decurrence along the angles of the stems. The stems a little under and a little above the surface of the ground were tinged of a bright crimson colour. The foliage changed first to a foxy brown, bleaching to a dull white next day. On the third day after the application it was observed that the portions of stems which were crimson-coloured in the first instance had changed to a dull white, the external tissue being decomposed. Where the decomposition extended on the stem below the surface of the ground, a fungus of a bluish-green colour began to make its appearance. The stems above ground were, in short, all destroyed. A few sprung afresh from below the surface. When taken up, September 24th, the amount of sound produce estimated per acre was 1 ton 93 lbs. There were no diseased tubers.

Table V.—Results of Experiments with Cornish Kidney, Early Manly, and Early Champion Potatoes, planted 7 inches deep, in the Kitchen Garden, in rows 2 feet 4 inches apart, and 8 inches from plant to plant in the rows; cut Tubers employed for Sets. Results 1 to 14 are each from 22 feet of row; 15 and 16 from 50 feet.

			Weight of Tubers Sound.		Weight of Tubers Diseased.		Estimated Rate of Produce per Acre.		Rate per Cent. Diseased.
							Sound.	Diseased.	
	1.—Cornish Kidney.	Pints.	lbs.	oz.	lbs.	oz.	Tons.cwt.lbs.	Tons.cwt.lbs.	
1	Sulphuric acid, 1 to 12½ water	2	2	12	0	0	1 0 93	0 0 0	0·00
2	,, 1 to 25 ,,	1	2	10	0	0	0 19 99	0 0 0	0·00
3	,, 1 to 50 ,,	½	17	3	0	11	6 10 29	0 5 23	3·84
4	,, 1 to 100 ,,	¼	20	2	1	15	7 12 58	0 14 75	8·78
5	,, 1 to 150 ,,	1/6	22	5	2	13	8 11 98	1 1 33	11·19
6	,, 1 to 200 ,,	1/8	25	0	3	8	9 9 44	1 6 77	12·28
7	Nothing	..	31	8	2	15	11 18 71	1 2 27	8·65
	2.—Early Manly.	oz.							
8	Sulphate of magnesia	2	10	15	0	2	4 2 96	0 0 106	1·13
9	,, ,,	1	21	0	0	0	7 19 10	0 0 0	0·00
10	,, ,,	½	21	7	0	15	8 2 45	0 7 11	4·19
11	Chloride of lime	2	23	6	1	0	8 17 9	0 7 64	4·27
12	,, ,,	1	26	11	0	1	10 2 20	0 0 53	0·23
13	,, ,,	½	21	8	0	7	8 2 98	0 3 35	1·96
14	Nothing	..	22	15	0	12	8 13 86	0 5 76	3·24
	3.—Early Champion.								
15	Five rows, each 10 feet in length, plants *topped* May 17th . . .	..	66	5	7	0	11 1 1	1 3 37	9·56
16	Five rows, each 10 feet in length, plants *not topped*	..	68	2	10	8	11 7 6	1 14 111	13·35

Sulphuric acid 1 *part to* 25 *parts of water.*—Table V. 2. The quantity of sulphuric acid to a row of 22 feet in length was 1 pint in 25 pints of water, being at the rate of 106 gallons of sulphuric acid, and 2650 gallons of water per acre. In this experiment the general appearances were similar to those exhibited in the preceding; but the stems and foliage were not destroyed to so great an extent. The produce, however, was nearly $\frac{1}{20}$ less than where double the quantity of acid was employed. In this, as in the other case, there were no diseased tubers.

Sulphuric acid 1 *part to* 50 *parts of water.*—Table V. 3. Quantity to a row $\frac{1}{2}$ pint in 25 pints of water, estimated per acre, 53 gallons sulphuric acid, and 2650 gallons of water. The stems and foliage were less injured by the acid than in the preceding case. In the course of a week after the application, notwithstanding the partial destruction of the foliage, the roots emitted healthier fibres and runners than those of plants to which nothing was applied. At the end of June, roots of healthy appearance were even proceeding from the part of the stem between where the acid had decomposed the bark at and a little under the surface of the ground, and where the bark was quite dead from disease next the old set. The quantity of sound produce was at the rate of 6 tons 10 cwt. 29 lbs. per acre. The diseased portion was scarcely 4 per cent. of the whole produce.

Sulphuric acid 1 *part to* 100 *parts of water.*—Table V. 4. Quantity to a row $\frac{1}{4}$ pint in 25 parts of water. Estimated quantity per acre $26\frac{1}{2}$ gallons of sulphuric acid, and 2650 gallons of water. The foliage, compared with that in the preceding rows, was injured in a less degree than that corresponding with the ratio in which the acid was applied. Yet many of the leaves were partially burned. The effects of the acid were more especially manifested round the margins of the leaflets. But the peduncles and calyces appeared in all cases most readily affected by the application. Even at this degree of the dilution, the peduncles drooped, and the calyces turned red in a few hours after the application, and next day became brown. The amount of sound produce was upwards of a ton per acre above that of the preceding experiment; but the per-centage diseased was also greater, being fully equal to that of the row which had nothing.

Sulphuric acid 1 *part to* 150 *parts of water.*—Table V. 5. Quantity to a row $\frac{1}{6}$ pint, in 25 pints of water. Estimated quantity per acre, 17 gallons 5 pints of sulphuric acid, and 2650 gallons of water. Compared with the preceding, the foliage was still less injured. Sound produce increased nearly to the estimated amount of a ton per acre; but fully as much as 11 per cent. of the total produce was diseased.

Sulphuric acid 1 *part to* 200 *parts of water.*—Table V. 6. Quantity to a row $\frac{1}{8}$ pint, in 25 pints of water. Estimated quantity per acre, $13\frac{1}{4}$ gallons of sulphuric acid, and 2650 gallons of water. Diluted to this extent, the acid had the effect of slightly browning the foliage and partially checking the excessive vegetation of the tops, which were previously elongating at an over-rapid rate. In consequence of the slower development occasioned by this check, leaves of thicker substance and of a darker green were produced. When the growing extremity of a shoot is pinched or checked, the leaves below usually increase in size and in thickness of substance. Such was the case in this experiment with regard to the leaves existing previously to the application; and those subsequently formed were not so soft nor so pale green as leaves of the same age in the adjoining rows, to which nothing was applied. Excessive elongation of the stems and paleness of the foliage being amongst the characteristics of the disease, the effects of the application tending to the reverse of these conditions were favourably anticipated. On referring to the table, it however appears, that although the amount of sound produce, estimated per acre, was upwards of 9 tons 9 cwt., yet the proportion diseased exceeded 12 per cent. In short, the amount of sound produce was less, and the diseased portion more, than in the adjoining row which had *nothing*.

Solutions of *sulphate of magnesia* were applied, June 18th, to 3 rows of early Manly potatoes growing in the same plot of ground as those were to which the sulphuric acid was given. The rows were 22 feet in length; cut tubers were employed for sets, planted at the same distances as in the preceding experiments. The quantities applied to the respective rows were,

2 oz., 1 oz., $\frac{1}{2}$ oz. Sulphate of magnesia, in 25 pints of water.

Estimated per acre, the above quantities correspond with 106 lbs., 53 lbs., and $26\frac{1}{2}$ lbs. To three other rows the same quantities of *chloride of lime* were similarly applied. For the results, see Table V. 8 and 13 inclusive. The above solutions did not injure the foliage when applied. They produced no marked effect on the plants. In the row to which 1 oz. of sulphate of magnesia was applied, there were no diseased tubers; and in the row which had 1 oz. of chloride of lime, less than 1 per cent. was diseased. The Early Manly variety, however, appeared to be less affected than the others here experimented with; for the produce of the row which had nothing, Table V. 14, was diseased to the extent of not more than $3\frac{1}{4}$ per cent. A larger proportion than this was diseased in the row to which

½ oz. of sulphate of magnesia was given; and also in that which had 2 oz. of chloride of lime.

Topping the stems.—Table V. 15. On the 17th of May, the plants in 5 rows of the Early Champion were topped. They were then rapidly elongating in the same compartment with the Cornish Kidney and Early Manly above mentioned. The rows were each 10 feet in length. About two inches were cut off from the extremity of every shoot. A corresponding extent of adjoining rows was marked off at the same time; but in this the plants were not stopped. The amount of sound produce was at the rate per acre of 6 cwt. 5 lbs. in favour of *not stopping*. The operation of stopping must therefore be considered disadvantageous. With regard to the proportion diseased, the topped plants had the advantage; for whilst these had 9·56 per cent. diseased, those not topped were diseased to the extent of more than 13 per cent.

To these experiments a few remarks may be added respecting this year's disease in the Garden of the Society.

The disease was watched in the potato-plants in the open ground from an early stage of their vegetation. In the first planted quarter, in the kitchen-garden, symptoms of disease were observed in many of the plants almost as soon as they appeared above ground, in the end of May. The parts of the plants above ground were then, and for a considerable time afterwards, exceedingly healthy in appearance. From superficial observations they would have been pronounced, without hesitation, free from all disease. Insects and fungi were looked for in vain by many practised observers. On examination, the under-ground portions of stems, instead of being white, were found to have acquired a slight brown tinge; sometimes this was almost universal, but more frequently on one side only. A rustiness, or canker, ensued; notwithstanding which the stems grew vigorously. To prevent all attacks of insects, several rows had powdered lime frequently scattered over them, commencing when the plants had just got above ground. The lime employed was of the most caustic description, and reduced to powder, not by slaking, but by grinding, being such as is prepared in this manner for certain purposes of the builder. The disease, however, progressed in the plants limed similarly as in those adjoining, which were not limed. Whether more or less affected, the plants grew tall in the kitchen-garden quarters; yet their stems were not so generally destitute of axillary shoots as was the case with those under the influence of the disease in

the two previous seasons. The skin of the under-ground parts of the stems, at first only discoloured, had a withered appearance when examined in the middle of June; and about that period some spots began to appear on the foliage.

It may be remarked that the above indications were similar to those observed in the preceding season; and it was fully expected that the stems and foliage would rot as soon as wet weather favoured the process; for such result followed similar symptoms in 1846. In that year, with disease producing visible effects on the plants below ground, and doubtless pervading their whole vegetation, it was not expected that the stems would be able to continue a supply of nourishment to the tubers; and in the end of June an attempt was made, by additional earthing up, to induce fresh roots above the decaying under-ground part of the stems. A few roots were produced, but insufficient to reinvigorate the bulky, but unsound, tops. From continued deprival of adequate nourishment, and from inherent local disease, the stems subsequently flagged during a period of heat and drought. Dryness not being conducive to the rotting of vegetables, the potato stems lingered till they became surcharged with moisture, admitted through diseased tissue. In a few days the whole of the stems and foliage was completely disorganized, and became a mass of putrefaction.

Judging from a comparison of symptoms and extent of disease at the beginning of July, in this and the preceding crop, it certainly was not anticipated that the plants would exhibit any signs of decidedly healthy vegetation during the remaining period of their existence, in the present season. In the course of last July, from prostrated stems, some very fresh healthy foliage was however produced; *healthy tissue was in many instances protruded over the cankered portions of the under-ground parts of the stems;* and fresh roots were also then emitted. Nothing like this healthy action was evinced by potato plants in 1845 and 1846, in the Garden of the Society, at a similar period of their growth.

The foliage, which resulted from an apparently fresh start of growth in July, was of a lively green, very different from that yellowish tint which characterized the young foliage produced at a similar period in the two former seasons. From this fresh foliage the healthy substance must have returned uncontaminated along the stems till it reached the previously diseased parts on the under-ground portion of stem. It had then no longer any direct channels; and like the organized matter from the base of a cutting, it was excreted in the form of comparatively naked tissue. Even in this state it seemed not affected by the diseased surface over which it progressed; and this leads to the conclu-

sion that the disease had in last July ceased to be active. Stems and foliage produced under its influence, and tubers connected with them, did retain vestiges of previous morbid action. It was not to be expected, although the plants exhibited signs of returning health, that the tubers, commencing their organization when disease was prevailing, would be sound. One observation, favourable to the presumed return of the potato plant to a healthy state, may yet be introduced. In 1845 the haulm commenced to die off rapidly in the middle of August. In a few days not a green leaf was to be seen in whole fields. In the present season, there was a sprinkling of fresh foliage remaining in many instances two months later, and in some till the middle of November.

Potatoes raised from Seeds.

In consequence of the strong opinion entertained by many persons, that the potato disease is caused by exhausted vitality, and that therefore it would disappear if the vitality were reinvigorated by raising seedlings, some experiments directed to that point have also been instituted.

Potato seeds were received from Baden, through Mr. John Adams, of Bromsgrove; from Mussooree, through the East India Company; from Poland, sent to Lord Palmerston by Colonel Du Plat, her Majesty's Consul at Warsaw; and from Messrs. Hardy, Maldon, in Essex. Some of these were sown in pans in the vinery, the plants being afterwards hardened off in a cool frame previously to planting in the open ground. The results are given in Table VI.

TABLE VI.—RESULTS of SOWING POTATO SEEDS.

		Length of Row, in Feet.	Weight of Tubers Sound.		Weight of Tubers Diseased.		Calculated Rate of Produce per Acre.						Rate per Cent. Diseased.
							Sound.			Diseased.			
			lbs.	oz.	lbs.	oz.	Tns.	cwt.	lbs.	Tns.	cwt.	lbs.	
1	German seed, from Baden, sown in gentle heat April 3; planted out April 30	32	15	13	1	11	4	2	41	0	8	88	9·64
2	Ditto	32	14	9	2	12	3	15	95	0	14	25	15·84
3	Seed from Mussooree, sown in the open ground March 18 . .	46	7	2	2	6	1	6	30	1	8	86	25·00
4	Seed from Mussooree, sown in gentle heat April 3; planted out April 30	32	1	15	0	7	0	10	6	0	2	31	18·42
5	Seed from Poland, sown in gentle heat May 24; planted out June 16	32	11	3	1	13	2	8	30	0	9	49	13·94
6	Seed from Poland, sown in the open ground May 24	32	4	6	3	15	1	2	87	1	0	33	47·36
7	Ditto	32	1	9	4	3	0	8	15	1	1	90	72·82
8	Ditto	32	4	7	3	15	1	3	12	1	0	53	47·01
9	Seed from Maldon, Essex, sown in the open ground March 18 .	18	7	15	3	5	3	13	35	1	10	74	29·44

It will be observed, that those forwarded in heat and transplanted, gave a better produce with a less proportion diseased than those sown at once in the open ground. Nos. 1, 2, 4, and 5, transplanted, gave on the average 2 tons 14 cwt. 10 lbs. of sound produce estimated per acre; and of the total produce 14·46, or very nearly 14½ per cent., was diseased. The results of Nos. 3, 6, 7, 8, 9, sown in the open ground, were at the rate of 1 ton 6 cwt. 80 lbs. of sound produce; and of their total produce upwards of 44 per cent. was diseased. When sown in the open ground, the seeds of course must be near the surface, and the roots are consequently more shallow than is the case where the seedlings are transplanted. But whatever mode may be adopted, it is evident that no good result, as immediately regards the disease, is likely to be derived from sowing seeds. Nor can it be said that of all the experiments thus detailed any one has proved so effectual in stopping the disease as to offer satisfactory proof that a perseverance in it would be advantageous.

XIII.—*Notes on the Wild Potato.* By John Lindley, Ph. D., F.R.S., Vice-Secretary.

AMONG the speculations that have been entertained respecting the Potato disease, one consisted in the belief, that in order to be secure against its future ravages, it was only necessary to bring the plant once more from its native country, and begin over again the process of domesticating it.

Before entering upon this experiment, it was necessary to ascertain with certainty what the native country of the Potato really is; for it did not appear probable that domesticated Potatoes, although brought from the regions in which the plant is wild, would be exempt; nor indeed could experiments with varieties already affected by domestication satisfy the conditions of the problem. The soundness of the opinion just expressed is sufficiently shown by the highly diseased condition of New Grenada Potatoes, cultivated in England in 1847, and by the result of an experiment in the Society's Garden in 1847 upon the golden Potatoes of Peru. In the autumn of 1846, a barrel of this variety was liberally given to the Society by Messrs. Gibbs, Bright, and Co., of Liverpool. The tubers were planted in Nov. 1846. When they appeared above ground it was found, that besides the Golden Potato of a yellowish colour, with yellow flesh, there were two others—one having bright rose-coloured blossoms, with red roots and tubers; the other large purplish blossoms and round mottled tubers. The Golden variety was much diseased, nearly one-third of the crop being affected. The

other two varieties escaped. It is obvious that the latter circumstance is precisely analogous to what occurs with our English varieties, when some sorts escape in some places, while other sorts in the same places are diseased.

Notwithstanding all the researches that have been made into the origin of the truly wild potato, doubtful and contradictory evidence still obscures its history. Not to notice the old rejected statements on this subject, we find Meyen (Botanical Geography, p. 312, Eng. ed.) giving as its native stations the whole western side of South America, mentioning, that he himself found it wild in two places on the Cordilleras of Peru and Chile; and adopting the evidence of the Spanish botanists, Ruiz and Pavon, that it occurs wild on the mountain of Chancay; but pronouncing positively, as it would seem on the authority of Humboldt, that it was not cultivated by the Mexicans before the arrival of Europeans. It is not, however, absolutely certain that the plants found by Meyen and the Spaniards were really wild; Mr. Darwin obtained much better evidence upon the subject during the voyage of the Beagle. In latitude 45° S., on the east coast of South America, there is a cluster of islands, called by geographers the Chonos Archipelago. "The wild potato," Mr. Darwin states, "grows on these islands in great abundance, on the sandy, shelly soil near the sea-beach. The tallest plant was four feet in height. The tubers were generally small, but I found one of an oval shape, two inches in diameter: they resembled in every respect, and had the same smell as English potatoes; but when boiled they shrunk much, and were watery and insipid, without any bitter taste. They are undoubtedly here indigenous; they grow as far south, according to Mr. Low, as lat. 50°, and are called Aquinas by the wild Indians of that part; the Chilotan Indians have a different name for them. Professor Henslow, who has examined the dried specimens which I brought home, says that they are the same with those described by Mr. Sabine, from Valparaiso, but that they form a variety which by some botanists has been considered as specifically distinct. It is remarkable that the same plant should be found on the sterile mountains of central Chile, where a drop of rain does not fall for more than six months, and within the damp forests of these southern islands."

There can here be no mistake. A naturalist like Mr. Darwin could not but know potatoes when he saw them; and the whole history of their occurrence is exactly that of a wild plant. It is, however, very certain that in Chile itself the potato is really wild, in the latitude of Valparaiso, for it is described under the name of Maglia by Molina and others; and this potato, sent to England by Mr. Caldcleugh in the year 1822, and grown

in the Garden of the Society, is no more distinguishable from our cultivated varieties than they are from each other. It is true that it has been separated botanically, either as a race or species, under the name of Solanum Commersonii; but specimens of this Maglia now before me, gathered in the Garden in 1825, are unquestionably those of the species now cultivated all over Europe.

Dr. Hooker (*Flora Antarctica*, ii. 330) extends the range of the wild potato by including Peru, Mendoza, and Buenos Ayres, the Maglia reaching quite across the continent, and growing about Buenos Ayres in hedges. The last statement is upon the authority of the late Dr. Gillies; but as it is not quite certain that the plant he found in such situations is really the Maglia, it seems better to limit the undoubted locality of wild potatoes within the parallels of 30° and 48° S. lat.

This supposes that the potato is not found truly wild in Peru, but that all the northern localities mentioned by authors are those of the cultivated plant. Upon this supposition the wild potato has not, as far as I am aware, been brought to Europe since the potato disease broke out; and if so, experimental proof that the wild South American sort is free from disease remains to be obtained.

But I believe myself to be in a condition to show that it is a mistake to say that the cultivated potato, that is to say Solanum tuberosum, is unknown in a wild state in Mexico. To the kindness of Mr. C. A. Uhde, a German gentleman, who has resided for many years in the west of Mexico, the Society has been indebted for various samples of wild Mexican potatoes, among which two varieties have been raised, which are undoubtedly mere forms of the true potato, as will be hereafter mentioned.

Tubers of another kind were received, July 25th, 1846, from Michuacan and the Valley of Toluca; and again in May, 1847, in a packet marked "Native Mexican Potatoes from an elevation of 8000 feet." These produced a tall species, whose stems and leaves were very hairy, so as to have a somewhat hoary appearance. The plants had a strong tendency to produce a vast number of runners, but scarcely any tubers. The few that were occasionally met with were very small. Some were found an inch and a half in length, and an inch in diameter; but generally they were not larger than the seeds of kidney beans. Their form is somewhat obovate, tapering to the end attached to the runner; and their colour was whitish. *They exhibited no symptoms of disease.*

This potato is also, I think, a mere variety of Solanum tuberosum, with which it agrees in every thing except its excessive

hoariness, and its unwillingness to produce tubers. When placed by the side of the Maglia of Chile, there is no apparent distinction. It seems to be a white-flowered variety of the Solanum verrucosum, figured by Professor Schlechtendahl in his *Hortus Halensis*, Fig. 2; his plants were raised in the Halle garden from tubers sent from Mineral del Monte by Mr. Charles Ehrenberg, upon whose authority it is stated to be common by pathways in woods, among ruins of walls (*in muris*), and elsewhere. I am unable to discover any botanical distinctions between this Solanum verrucosum and another wild Mexican plant, published by Schlechtendahl and Bouché in the *Verhandlungen des vereins zur Beförderung des Gartenbaues in den Preussischen Staaten*, vol. ix. p. 317. That plant was from the Volcano of Orizaba, at an elevation of from 10,000 to 11,000 feet, where it is said to be known by the name of "Papa cimarron." The authors just mentioned call it, indeed, Solanum stoloniferum, but it is not so different from S. verrucosum as many cultivated potatoes are from each other.

In addition to the foregoing, which appear to prove conclusively that the potato is either wild in Mexico or has become so, two very different potato-bearing plants were received from Mr. Uhde.

The first of these was marked "Native Mexican Potatoes, growing at 8000 to 9000 feet elevation." This proved a particularly dwarf sort. It was planted May 2, and was in flower in the end of June. Its flowers are produced close to the ground, and fruit soon succeeds them; branches then push up, and blossom at the height of 12 to 15 inches.

The foliage and stems have a grey appearance; and yet the hairs upon them are inconsiderable in number and much scattered. The leaves are from 4 to 6 inches long, pinnated like the potato, and often with numerous small leaflets placed between the larger ones; but many leaves consist of large leaflets alone. The latter form two to three pairs, with a terminal odd one; they are extremely blunt, broadest at the end, flat, and perfectly sessile. The flowers are nearly an inch across, and bright violet, arranged in loose terminal dichotomous somewhat scorpioid racemes. The calyx is hairy, and is 5-cleft with acute triangular acuminate teeth. The corolla is 10-toothed, with a nearly circular outline, and reflexed so as to hide the calyx. The stamens are small in proportion to the size of the corolla, and shorter than the style. They are succeeded by smooth globular berries about as large as a black currant. Very few tubers were formed. Many stems had none; and where they did occur they were small, flattened, somewhat kidney-shaped, and of white colour, with white, crisp, semi-transparent flesh.

Solanum demissum.

This appears to be distinct from the potato, and may be called *Solanum demissum*,* because of its dwarfness. It was attacked by the disease in July. *The stems exhibited the characteristic blotches in a worse degree than any other sort in the Garden.* The runners were also affected.

Amongst the "Tubers of Mexican potatoes growing at 8000 to 9000 feet of elevation," which proved to be chiefly the two sorts last mentioned, there was a plant entirely different from either. It had an erect stiff stem, about a foot in height, very dark-green heart-shaped leaflets, and small cream-coloured flowers much like those of the black nightshade (Solanum nigrum). It formed very small roundish white tubers, which were less watery than the last, and it was not attacked by disease. From its having been found mixed with other samples of potatoes, it had probably been gathered accidentally.

This species, although producing potato-like tubers, and belonging to the same section of the genus as the true potato, can in no way be confounded with it. It does not appear to be of any value, but deserves to be put on record as a curious new form of the genus. Its deeply heart-shaped leaves render the name *S. cardiophyllum* † appropriate.

In addition to the foregoing, packets were also received from Mr. Uhde, labelled "Tubers of a Red Potato, found growing wild in Mexico at 8000 feet elevation, possibly brought from Peru;" and "Tubers of a Potato found in Mexico, supposed to be Peruvian;" a third packet contained some "Red Potatoes, like Peruvian." These all proved to be a small, but productive sort of potato, round and pink-coloured, very like the Azores variety. Amongst them one plant had white kidney-shaped tubers. Their stems and foliage were much like those of some varieties of the common potato, and distinct from the others imported from Mexico along with them. They were all affected slightly by the disease.

The foregoing facts, and those adduced in Mr. Thompson's Report, No. XII., prove conclusively that there is no known preventive of the disease; that neither renewal by seed, nor intro-

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* S. *demissum;* herbaceum, prostratum, stoloniferum, tuberosum, cæsium, pubescens, foliis subinterruptè pinnatis, foliolis obovatis rotundatis, calycis 5-fidi laciniis triangularibus acuminatis, corollâ circulari 10-dentatâ, baccis sphæroideis glabris.

† S. *cardiophyllum:* herbaceum, erectum, stoloniferum, tuberosum, atroviride, glaberrimum, foliis auriculatis pinnatis 2-3-jugis, foliolis haud interruptis subrotundis cordatis carnosulis decrescentibus, cymis paucifloris terminalibus, calyce glabro cyathiformi quinquedentato, corollâ 5-partitâ laciniis triangularibus planis acuminatis demum revolutis.

Solanum cardiophyllum.

duction from foreign countries, nor treatment in the earth, afford any guarantee against its attacks; and that its progress cannot, in the present state of our knowledge, be resisted with such success as to justify the recommendation to the public of any of the remedies hitherto proposed.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

1. Spiræa expansa. *Wall. Cat., Herb. Ind., No.* 702.

Received from Mr. Glendinning in 1846; said to have been raised from seeds received from Kamoon.

A bush covered in every part with soft short hairs. Its young branches are brownish green. The leaves are stalked, elliptic lanceolate, simply serrated above the middle, whitish beneath, wrinkled above, and not in the least shining; but of one uniform dull yellowish green. The flowers are small and pink in broad terminal corymbose panicles, which are so flat as to form the appearance of a table of flowers. In the wild specimens the panicles appear to be as much as nine inches across.

It is a hardy shrub, which grows freely in any good common garden-soil, and is easily increased by cutting of the half-ripened wood in the autumn.

It must be regarded as a fine species. It remains rather long in flower and blooms abundantly.

July 10, 1847.

2. Gilia pharnaceoides. *Benth. in Bot. Reg. sub n.* 1622. *Hooker, Fl. Bor. Am.* 2, t. 161.

A slender, purple-stemmed branching plant, minutely downy near the base, but otherwise smooth. The leaves, which are opposite, are split as far as the very base into three or five thread-shaped, deep-green segments, whence they appear as if verticillate; quite at the base they are rather downy. The flowers appear at the ends of the straggling branches on very slender but firm stalks about half an inch long, are a very pale lilac, slightly streaked with a darker tint of the same colour, and measure about half an inch in diameter; they have a tube no longer than the calyx, and yellow anthers. Their appearance is exactly that of a Leptosiphon without a tube.

As a hardy annual and new this may have a little interest, but it is very inferior to the Leptosiphons, which it most resembles.

Aug. 28, 1847.

3. Hugelia lanata.*

An annual about nine inches high, quite white with the short wool that covers every part, except the corolla and organs within it. The leaves are linear, with a somewhat spiny point, and one to three short segments on each side; they are about two inches long, and have none of the greenness of H. elongata. The flowers are a clear light blue, and are placed in close heads, arranged in a corymbose manner. Beyond their throat project five long linear arrow-headed white anthers.

It is not a striking plant, but may be found useful as a novelty among hardy annuals.

Aug. 30, 1847.

4. Arthrostemma fragile.†

Raised from seeds gathered by Mr. Hartweg in the west of Mexico, and received in January, 1846.

A light green brittle-stemmed shrub, about three feet high, and covered slightly with fine glandular scattered hairs. Leaves stalked, about two inches long, ovate, very slightly cordate, five-nerved, acute, and finely serrated. Flowers an inch and a half across, in loose few-flowered terminal cymes. Petals oblong, slightly mucronate, deep rosy purple. Anthers nearly equal in size, furnished at the base with a short incurved bifid spur. Apex of the ovary free, slightly hispid; its interior is two-celled, with two spurious additional dissepiments, which make it four-celled.

Mr. Bentham, in a letter to the Editor, remarks that this species "is not among Mr. Hartweg's dried plants. As to the genus, it is very near De Candolle's section *Monochætum* of Arthrostemma; but the appendages of the anthers are all bifid at the extremity, and the ovary has but two cells instead of four. It differs from Heteronoma by the anthers of both series being fertile and nearly equal and similar, as well as by the nervation of

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* H. *lanata;* undique densè albolanata, foliis parcè pinnatifidis linearibus subpungentibus laciniis brevibus nunc ferè obsoletis, capitulis breviter pedunculatis subcorymbosis, bracteis paucis brevibus linearibus recurvis subpungentibus, calyce lanuginoso cylindraceo laciniis brevibus erectis integerrimis inæqualibus tubo corollæ multo brevioribus, staminibus exsertis antheris altè sagittatis, ovulis 6-8.—J. L.

† A. *fragile* (Monochætum); ramulis tetragonis distanter glanduloso-pilosis, foliis ovato-cordatis acutis quinque-nerviis argutè serratis, cymis laxis terminalibus distanter paucifloris, calycis tubo obovato-oblongo glanduloso, petalis oblongis concavis mucronulatis, antherarum calcare bifido. —J. L.

the leaves. The setæ on the ovary are small and few, but they exist; and its close affinity is evidently with Arthrostemma (Monochætum), a good genus, if all Arthrostemma be not united to Chætogastra."

It is a stove shrub, growing readily in a mixture of loam, peat, and leaf-mould, and easily increased by cuttings. It flowers from June to September, but its blossoms are very fugitive; they are, however, gay-coloured, and make an agreeable variety, especially as they are associated with a fine deep green shining foliage.

Aug. 31, 1847.

5. Peperomia pallescens. *Miquel, in London Journal of Botany*, vol. vi. p. 460.

Presented to the Society by G. U. Skinner, Esq., in April, 1846, from Guatemala.

A fleshy-stemmed plant, perfectly destitute of fragrance, with soft round fleshy half herbaceous branches. Leaves cordate ovate, very slightly toothed or quite entire, covered beneath and on the foot-stalk with very fine hairs, and marked on each side with minute brown points. Flowers in green drooping tails about six inches long.

This stove plant grows freely in a light sandy loam, and is easily increased by cuttings. It flowers in July, is merely curious, not at all ornamental, and only worthy a place in a botanic garden.

Sept. 5, 1847.

6. Lycoris straminea.*

Received from Mr. Fortune in 1845 from China.

This plant, although nearly allied to *L. aurea*, is distinguished not only by its having pale straw-coloured flowers, with a pink line along the middle of the segments, and a few scattered dots, but also by the segments being shorter, and scarcely at all joined at the base in a tube.

It is a pretty bulbous plant, apparently as hardy as a Narciss, growing freely in any good rich garden-soil. It is increased by offsets from the old bulbs. If it should prove quite hardy, it will be desirable for the flower-garden.

Aug. 30, 1847.

7. Oncidium tenue.†

Received through Mr. Hartweg in February 1841, from Guatemala.

This is a small Oncid, remarkable for its exceedingly thin pseudo-bulbs, which, although 2 or 3 inches long, are not more than $\frac{1}{8}$ of an inch thick in the middle, from which they

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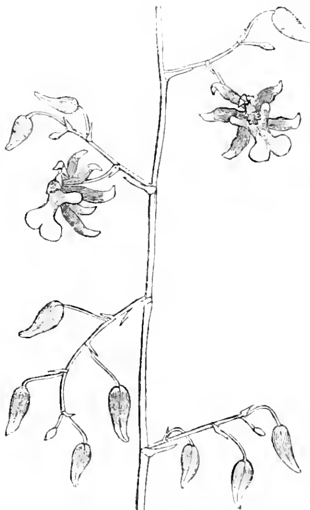
* L. *straminea;* ovario subsphærico, tubo brevissimo, perianthii laciniis lineari-oblongis undulatis staminibus brevioribus.—J. L.

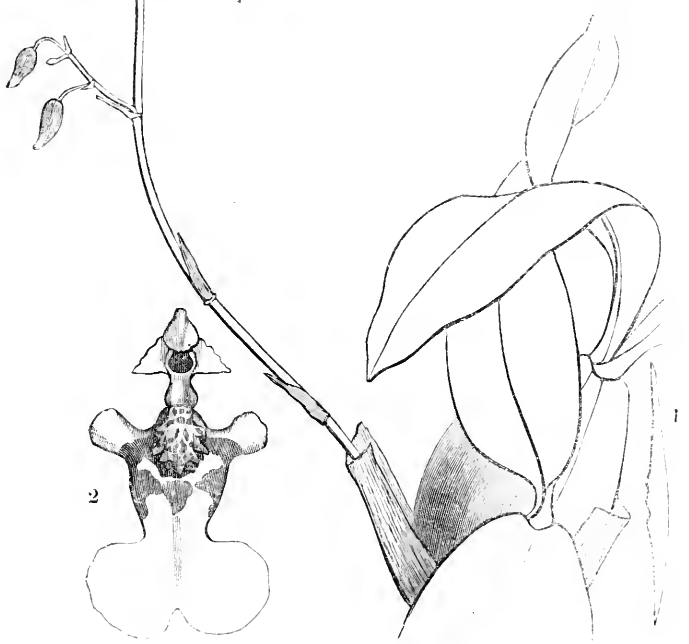
† O. *tenue;* (§ Heteranthia pentapetala micropetala, labello pandurato) pseudobulbis ovalibus tenuissimis hinc obsolete costalis, foliis membranaceis ovato-lanceolatis patulis, paniculâ angustâ racemosâ, ramulis 3-4-floris, labelli lobo intermedio subrotundo bilobo auriculis parum latiore, cristæ tuberculo 5-7-dentato glabro, columnæ alis acutè triangularibus.—J. L.



gradually fine away into an edge, which is almost acute. The leaves are thin, oblong-lanceolate, and much shorter than the slender narrow racemose panicle, the branches of which are nearly of the same length, each bearing 3 or 4 flowers. The latter are not unlike those of Oncidium Suttoni in size and colour; that is to say, yellow, mottled with brown.

This species is distinguished from Oncidium suave by its broader leaves and acutely triangular column-wings; and from O. citrinum by its roundish oblong pseudo-bulbs, large column-wings, broad leaves, peculiar habit, &c. &c.

It is not of much beauty, but



adds something to the variety previously known among the species of its own division.

Fig. 1 represents a transverse section of the pseudo-bulb; 2 shows the column and lip magnified. The representation of the plant itself is much reduced below the natural size.

Sept. 10, 1847.

8. Pogogyne multiflora. *Benth. Lab.*, p. 414.

Raised from seed collected by Mr. Hartweg, in "fields about Sonoma," in California.

A dwarf labiate annual, emitting a strong smell of horsemint, when bruised, owing to the leaves, which are perfecly smooth, except near the base and when they are young, being copiously marked with small pits connected with cysts of volatile oil. The stems are from 4 to 5 inches high, four-cornered, brittle and smooth, branching from the base. The leaves are 1½ inch long, including the stalk, which in the lowest forms one half, oblong, and very blunt; occasionally they have a minute tooth upon the edge. The flowers are of a pale lilac colour, and are arranged in spiked verticillasters at the end of the shoots. Each is rather more than ½ an inch long, with a 4-lobed bilabiate limb, whose segments are blunt and of nearly equal size. The anthers project a little beyond the orifice; the hairy style is longer than the upper lip. The bracts are linear-lanceolate, about as long as the corolla, and fringed with long hairs.

It is a hardy annual, growing freely in any rich soil, and like most Californian plants of the kind may be sown at different seasons. It flowers in August and September if sown in May.

A rather pretty dwarf spreading species, requiring plenty of moisture in summer to keep it in bloom, which is produced for a long time.

Aug. 20, 1847.

9. Clematis tubulosa. *Turczaninow, Bulletin des Nat. de Mosc.* xi. 148.

Received from Dr. Fischer in 1846.

This is the most remarkable Clematis in our gardens. It forms a branching upright herbaceous plant, with stiff angular purple downy stems, and great, smooth, shining, ternate leaves, of a pale bright green, the larger leaflets of which are 3 inches long and 2½ broad, bordered by coarse mucronate serratures. The flowers appear in sessile corymbs in the axils of the leaves, on stalks about 1½ inch long; they are about an inch long when full blown, of an intense blue, and extremely handsome.

So different is this plant in appearance from a Clematis, that the Russian botanist who first described it was in doubt whether it belonged to the genus; it does not, however, differ generically, nor do the flowers appear to be unisexual, as he describes them. It was originally found in the north of China by Porphyrius Kirilow, by whom its seeds must have been communicated to the Botanical Garden of St. Petersburgh.

This fine plant succeeds freely in any good garden-soil, but cannot be considered anything more than herbaceous, for it retains little of the previous year's growth. It suffered much from cold during last winter, and probably will not be more than half hardy. It is easily increased by cuttings of the young wood, and is a fine, showy, herbaceous plant, flowering in August and September.

Sept. 20, 1847.

ORIGINAL COMMUNICATIONS.

XIV.—*A Notice of some species of Rhododendron inhabiting Borneo.* By John Lindley, Ph.D., F.R.S., Vice-Secretary.

When Mr. Hugh Low returned from his visit to Borneo, he was so obliging as to place in my hands some drawings and dried specimens of certain species of Rhododendron which occur in that island *growing upon trees*. They are found to be very distinct from all previously known, and in many respects so deserving of notice, that it has been thought advisable to prepare the following short memorandum concerning them.

In Mr. Low's account of Sarawak* they are spoken of thus:—

"Perhaps the most gorgeous of the native plants are the various species of the genus Rhododendron, which here assume a peculiar form, being found epiphytal upon the trunks of trees, as in the genera of the tribe Orchidaceæ. This habit, induced probably by the excessive moisture of the climate, is not, however, confined to the Ericaceous plants, but also prevails with the genera Fagræa, Combretum, and many others, usually terrestrial; the roots of the Rhododendrons, instead of being, as with the species, inhabitants of cold climates, small and fibrous, become large and fleshy, winding round the trunks of the forest-trees; the most beautiful one is that which I have named in compliment to Mr. Brooke. Its large heads of flowers are produced in the greatest abundance throughout the year: they must exceed in size that of any known species, frequently being formed of eighteen flowers, which are of all shades, from pale and rich yellow to a rich reddish salmon colour. In the sun the flowers sparkle with a brilliancy resembling that of gold-dust.

"Four other species which I discovered are very gorgeous, but of different colours, one being crimson and the other red, and the third a rich tint between the-e two: of the fourth I have not yet seen the flowers. Besides the curious nature of the root above noticed, botanists may learn that these species differ from others of the genus in having very small, almost imperceptible calyces, and caudal appendages to the seeds; these last greatly facilitating the attainment of a situation favourable for their growth."—p. 65.

The peculiar habit ascribed to these plants of forming large fleshy stocks, instead of the fine fibrous roots proper to the Azaleas and Rhododendrons at present in cultivation, is also met

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* *Sarawak; its Inhabitants and Productions*, &c. By Hugh Low, Colonial Secretary at Labuh-an.

with in the kindred Cranberries (*Vacciniaceæ*) of South America, among which several *Thibaudias* may be named; the epiphytal character has indeed been observed among plants still more nearly allied to Rhododendron, as in *Anthopterus racemosus* and a species of *Sphyrospermum*, both which grow upon trees in the Peruvian Andes.

The four species now described belong to a supposed genus called *Vireya* by Blume, and distinguished from *Rhododendron* by the seeds being extended at each end into a slender tail-like process. But this circumstance, the only one that is at all peculiar to the Malay Rhododendrons, disappears in *Vireya retusa*, whose seeds are shown by Dr. Horsfield's figure of that plant to be in no respect different from those of *Rhododendron arboreum*. In the latter species the seeds are furnished with short thick hairs at each end; in *Rhododendron campanulatum* they are reduced to mere tubercles; in *Azalea indica* they wholly disappear; while in *Azalea pontica* they occur in the form of thick processes connected with a broad wing which surrounds the seed either wholly or in part. Hence we are led to infer that such circumstances are of no generic value, and therefore botanists have universally rejected the genus *Vireya*.

I.—Rhododendron Brookeanum. *Low*.

Sp. Char. Leaves oblong-lanceolate, acute, perfectly smooth, nearly sessile, without any trace of dotting or marking on the under side. Peduncles smooth. Flowers in loose umbels. Calyx obsolete. Corolla between funnel-shaped and campanulate, 5-lobed; the lobes retuse, revolute, nearly as long as the tube. Stamens 10, prominent, with linear converging anthers.

This noble plant not only grows on trees, but, according to one of Mr. Low's memoranda, is occasionally met with "on moss-covered limestone rocks, flowering from November to July." Another note upon it is the following:—

"I shall never forget the first discovery of this gorgeous plant; it was epiphytal upon a tree which was growing in the water of a creek. The head of flowers was very large, arranged loosely, of the richest golden yellow, resplendent when in the sun; the habit was graceful, the leaves large. The calyx of this and the other Borneo species is so small as to be scarcely perceptible. The roots are large and fleshy, not fibrous as those of the terrestrial Rhododendrons. It is the least common of all the genus in the island, and has many varieties, which differ in having larger flowers and leaves: the former of a more or less red colour. Very high and large trees in damp forests are its favourite haunts."

Rhododendron Brookeanum

In his *Sarawak* we find it mentioned in the following paragraph :—

"The still river, winding its way amidst the limestone, which is shaded with overhanging trees, is nevertheless very pretty; and the hill opposite to which we now lie rises in a precipice 200 feet above our heads, its face being covered with climbing plants, and the projections of the rocks covered with ferns and other plants, among which I observed the bright flowers of the beautiful and new yellow *Rhododendron Brookeanum*, and the elegant fern-like foliage of a large-leafed, stemless palm."—p. 374.

This species is allied to *Rhododendron javanicum*, from which it differs in having much larger flowers, and nearly sessile, not long-stalked, leaves, the under side of which is entirely destitute of the rusty specks which characterise the Java plant. Coloured drawings of two varieties are before me,—one yellow, the other rich red.

The *Yellow* is represented with 14 flowers in a loose cluster, of a rich buff colour, and two inches across the limb. The colour, however, is stated by Mr. Low to be incorrect, and it is probably much too dull. The annexed cut represents this variety diminished.

The *Red* has larger leaves, and only five flowers in a cluster, in colour resembling the *Azalea indica lateritia*, but richer. They are more than three inches across the limb.

Of the former of these dried specimens have been preserved, from which and the drawing together the figure has been prepared.

II.—Rhododendron gracile. *Low.*

Sp. Char. Leaves lanceolate, very long, drooping, tapering sharply to each end, quite smooth, but indistinctly marked on the under side with dark freckles. Peduncles smooth, much shorter than the flowers. Calyx obsolete. Corolla funnel-shaped, with a tube much longer than the irregular limb, whose lobes are flat, very blunt, and imbricated. Stamens exserted; anthers erect.

"This slender and beautiful Rhododendron," says Mr. Low, "is found on rocks at the 'Sirul' mouth of the Sarawak River. It is confined to a space of ground not extending over 200 yards square, and was never seen in any other place. It grows luxuriantly upon the sandstone rocks, which are covered with moss and decaying leaves to the height of from 4 to 6 feet. The seeds have tails, and, with the exception of its place of growth, it resembles the other Bornean species. It flowers all the year round."

Rhododendron gracile.

Its leaves are 6 or 7 inches long, and about $1\frac{1}{2}$ inch broad. The flowers are nearly 3 inches long and about 2 across the limb; they are of a rich fiery red, with a pale violet-coloured throat; the anthers are deep brown. In the drawing before me they are uniformly represented as having one or two of their lobes bent downwards more than the others; this peculiarity is also traceable in the dried specimens.

The accompanying figure is much reduced below the natural size, as will be evident from the measurements given above.

III.—Rhododendron verticillatum. *Low.*

Sp. Char. Young branches slightly downy. Leaves oblong, obtuse, stalked, heart-shaped at the base, downy on the petiole and midrib, dotted abundantly on the under side, arranged in irregular whorls. Peduncles downy, as long as the flowers. Calyx obsolete. Corolla nearly campanulate, with an erect 5-lobed limb. Anthers projecting, erect.

Of this plant I have seen no drawing; and the dried specimens are imperfect. It is, however, perfectly distinct from the other Malay Rhododendrons. Mr. Low has the following note about it in his *Journal*, October 14, 1846:—

"Near the top of the mountain (Gunong Penerissen, 4700 ft.) I discovered a plant of the smaller-leaved Rhododendron, which, for distinction's sake, I call R. verticillatum, in flower. On procuring it, which was done with some difficulty, as it was epiphytal on a tree overhanging the rocky side of the mountain, it had but one head of expanded flowers, which were of a reddish crimson colour, without spots. It was of large size in proportion to the leaves and stems, being 10 inches in diameter, and very compact. The leaves are verticillate, many in a whorl, and the wood buds are closely imbricated with scales, broad at the base, and with recurved points. The roots are long and fleshy, like those of the yellow Rhododendron (Brookeanum). It is found on the sides of the Dacrydiums and other trees, which are covered at that height with large and long moss. The atmosphere is very damp; and at night the thermometer stood at 64° F."

The leaves of this plant are in form like those of *Rhododendron campanulatum*, but are entirely free from the rusty down which covers the under side of that species; in its room the surface is thickly studded with minute ferruginous points; they are convex, revolute at the edge, and the largest 4 inches long by $2\frac{1}{4}$ wide. The flowers are between 2 and 3 inches long and about $1\frac{3}{4}$ inch across the limb.

Rhododendron verti.illatum.

IV.—Rhododendron longiflorum.

Sp. Char. Leaves verticillate, perfectly smooth, shining, obovate, convex, with a revolute edge, shortly stalked, with copious green points on both, especially the under sides. Peduncles short, erect, downy. Calyx obsolete. Corolla 3 or 4 times as long as the peduncles, with a long curved tube, and an erect short bluntly 5-lobed equal limb, which eventually falls back. Stamens as long as the corolla. Anthers short.

"This remarkable plant," Mr. Low writes, "is found on high trees in low and damp jungles in the vicinity of Sarawak; it grows about 8 feet high, and when covered with its crimson tube-shaped blossoms is exceedingly beautiful. It flowers when very small, but does not grow very freely until after it has attained considerable size. Its seeds are tailed, and in general habit it approaches the yellow and verticillate species (*R. verticillatum*)."

Although smaller in every part than the species previously described, this is hardly inferior in beauty, on account of the intense crimson colour of its long tubular blossoms. The latter are very distinctly curved, full 2 inches long, and grow in close heads, each consisting of from 9 to 10 flowers. The leaves are about 1½ inch broad, and 3½ inches long.

Mr. Low calls this species *Rhododendron tubiflorum*, a name I am obliged to alter, because it is not the same as the *Vireya* (or *Rhododendron*) *tubiflora* of Blume.

It has been suggested to me that these fine plants will not prove cultivable, because they are epiphytes. I cannot concur in this opinion. The mode of managing epiphytes is now so well understood, in respect to Orchids and Bromelworts, that even if it should be necessary to treat the Malay Rhododendrons in the same manner, no serious difficulty can be apprehended. Blume tells us that the Java species are mostly "parasitical on trees," that is to say epiphytes; and yet the *Rhododendron javanicum* is as manageable as *Rhododendron arboreum*.

The probability however is, that they do not require to be treated as epiphytes, and that, like orchids, they will grow better if committed judiciously to the earth. It was a sagacious remark of the late Dean of Manchester, that we are wrong in supposing plants always to prefer the places in which they are found naturally. He believed that plants often occupy particular stations, and exhibit particular habits, on account of the necessity of their position, and because in more favourable places they

Rhododendron longiflorum.

would be smothered by the surrounding vegetation. This may possibly be the case with the plants in question. It is quite conceivable that they may have taken refuge in Borneo in the branches of trees, because of the impossibility of establishing themselves in the marshy soil of a country frequently under water for long periods at a time: and there is nothing in the nature of things to render it improbable that the saturated air may yield them all the food they require in a country visited

by incessant thunderstorms, which deposit large stores of nitrogen upon every branch and every leaf.

In this view of their nature, it may be conjectured that the Malay Rhododendrons will grow under the usual treatment of a damp stove, provided the soil in which they are potted is chiefly composed of loose decayed vegetable materials, such as half and wholly rotten leaves and sticks. It will also be important to consider whether in resting them, it will be requisite to do more than slightly lower their temperature, and diminish, without withholding, the moisture which they appear to require. From the statements of Mr. Low, it would appear that Rhododendron gracile is perpetually in bloom, a circumstance that leads to the inference that a season of rest must be almost unknown to it.

Unfortunately we have no tolerable account of the details of the Bornean climate: the temperature of the soil, or the data from which it could be computed, the amount of atmospheric moisture, the relation which the cold of night bears to the heat of day, the rate at which temperature fluctuates, are all matters upon which information is wanted. In the meanwhile, Mr. Low's *Sarawak* must be taken as our best guide in the inquiry; and with the following extracts from his work, the present memorandum may be closed.

"The climate of Borneo, like that of most of the eastern islands, has been found exceedingly healthy to persons whose avocations do not render great exposure necessary. The north-east monsoon, or that which blows from April to October, is the rainy period; but a day rarely passes during the south-west or fine monsoon, without a refreshing shower; this with the constant warmth, causes everything to grow during the whole year, the forests being clothed with a perpetual verdure, which gives the islands, when seen from the sea, a beautiful appearance, possessed by no country in the world to so great an extent; shrubs (Hibiscus) and flowering trees (Barringtonia) always overhanging the margin of the ocean, and the inland mountains are observed covered to their summits with a dense and luxuriant vegetation.

"In temperature it has never been found by Europeans to be oppressively hot; the thermometer generally averaging 70° to 72° Fahrenheit in the mornings and evenings, and 82° to 85° at 2 P.M., which is generally the hottest part of the day; and though in the dry season the mercury has sometimes ascended as high as 92°, and occasionally 93°, it has not been felt so inconveniently oppressive to Europeans as a hot summer day in England."—p. 31.

"Though the vegetation of no country in the world is so luxuriant as that of the eastern islands, it has been proved by many

writers that the soil of some of them is not so fertile as the appearance of the forests would lead the cultivator to expect. This remark particularly applies to Sumatra, the forests of which are supported in their luxuriance, in a great measure by the moisture of the surrounding atmosphere."—p. 32.

"Thunder and lightning are so very frequent as to be little regarded by the inhabitants, though the former is more sonorous and the latter more vivid than in Europe.—In all the quiet seas of the East the lightning is very much dreaded by European shipping. A heavy shower of rain is always preceded by lightning and thunder, and generally by strong wind."—p. 31.

"Left early for Sebonyoh (Dec. 6).—One mountain near it had had all its trees destroyed about twelve months since by a fire, which had been ignited by the intensity of the sun's rays on the rock beneath, and which had so dried the vegetation that it spontaneously took fire, and the whole were destroyed. Nothing but a succession of very wet summers can again restore it."—p. 399.

The custom of building the houses on tall posts to keep them out of the water, sufficiently shows how formidable the floods must be in Borneo, and how damp such an atmosphere must be under a temperature of 85°.

XV.—*On a peculiar form of Mildew in Onions.* By the Rev. M. J. Berkeley, M.A., F.L.S.

Few crops more frequently disappoint the expectations of the cultivator than onions. Wet and dry seasons are alike injurious, and there are few years in which they do not suffer more or less from mildew; and this not merely under a bad system of cultivation or in indifferent soil, for highly mildewed crops occur in the most favourable situations, and where the management of them is best understood. The fields at Sandy, in Bedfordshire, where perhaps the best onions in England are grown, are extremely subject to mildew, as can scarcely have escaped the notice of any one who has been in the habit of travelling year after year along the road from St. Neot's to London. Neither is the mildew of one kind only, or confined to one particular organ or portion of the plant. Whole beds are destroyed in an early stage of growth by a parasitic fungus which attacks the leaves, and is nearly allied to *Botrytis infestans*, but which, instead of being white, is of a pale reddish grey, with spores far more elongated, and flocci quite destitute of the nodules which are so characteristic of the potato mould. Sometimes the crop seems for a time to be healthy, but gradually, after the formation

of the bulb, acquires a sickly hue, which rapidly increases: the leaves wither; the roots decay, and are covered at their junction with the bulb with a filmy mucedinous web; the bulb itself ultimately becomes loose from the destruction of the roots, and as the mould spreads entirely decays. In other instances a placentæform *Sclerotium* is formed at the base of the bulb, of greater or less size; while in other instances, again, the whole substance of the bulb and neck is impregnated with mycelium, in the midst of which appear multitudes of little black seed-like grains, which have been described as Sclerotium Cepæ, Lib.;* and specimens have been published under that name in the 4th Fasciculus of British Fungi. Still other forms of mildew occur, but it is to this latter that my attention has been more especially directed.

The dry summer of 1847 was in many districts extremely injurious to the onion crops. Whole breadths at once became dry and withered, frequently not from the presence of any disease, but from mere lack of moisture, and the bulbs were extremely small and insignificant. Mildew also was very prevalent, and various examples were forwarded to Dr. Lindley; some of which, and amongst them the form under consideration, were placed in my hands for examination. I happened at the time to be staying at Margate, where my friend Mr. G. H. Hoffman, with the assistance of a good compound microscope, had been making some observations on the mycelium of the parasitic fungi which attend or produce mildew, and I was glad of the opportunity of examining the present parasite with him. The specimens were somewhat decayed, in consequence of having been some time on the road, and their odour was extremely disgusting. On making a section through the plant, every part of it was found to be more or less decomposed, and filled with white mycelium, which was occasionally greenish from the juices of the matrix; amongst which appeared the *Sclerotium*, in various stages of growth, distinguished in the younger specimens by its compact substance, and in the older by the dark blackish cuticle. It was a matter of importance to ascertain, if possible, what was the nature of these globular bodies; and the manipulation applied by Mr. Hoffman to the observation of mycelium in other cases appeared likely to lead to some positive result.

Léveillé† has, in his interesting memoir on the genus *Sclerotium*, combated the pretensions of the substances comprised under that name to occupy a place amongst autonomous fungi; and, though his observations are as conclusive as the nature of the case would admit, without an experiment like that now recorded,

* Libert, Plantæ Cryptogamicæ Arduennæ, No. 238.

† Annales des Sciences Naturelles, 2de Série, vol. xx. p. 218.

which alone could furnish the means of seeing the actual development of the fungi from the mycelium of which they are so many anamorphoses, they require some direct confirmation, which does not, however, at all detract from their own original merit. It became, therefore, a matter of interest to embrace the opportunity now offered of following up the point.

It is well known that it is possible to watch many mucedines from the first germination of the spore to the complete development of the fructification, by simply placing the reproductive bodies in a drop of water on a slip of glass, covering it with a piece of microscopic glass, and luting the edges with wax to prevent evaporation. The mycelium is developed in the water, while the fertile branches make their way into the surrounding stratum of air, and bear fruit. It was determined to subject a portion of the mycelium from the tissues of the diseased onion, and a portion of the sclerotium, to this process. In one slip of glass our success was complete, in the others more or less perfect. A single observation, if possible, should not be relied upon. An extremely thin slice from the stem was taken, so thin as to enable us to distinguish easily the several parts of which the object was composed. The cells and vessels of the matrix were well defined, and the mycelium connected evidently with the sclerotioid granules, which were separated from each other by veins of flocci, very much in the same way in which sporangia of certain fungi are combined. It was easy also to recognise the structure of the *Sclerotium* as well externally as internally. The inner tissue was found to be not compactly cellular like that of *Sclerotium durum*, *complanatum*, &c., but filamentous, as in *Sclerotium Boletorum*, Corda, consisting of closely interwoven branched threads resembling on a small scale the tissue of the seed-pods of *Fucus vesiculosus*. This structure, it is obvious, made it more easy to trace the continuation of the mycelium from the tissue of the Sclerotium.

After the expiration of a few hours the slices began to assume a different appearance, from the elongation of the mycelium, which was protruded on all sides, and was branched and flexuous. Some portions were repeatedly articulated, others either entirely without articulations, or with merely one or two scattered dissepiments. As long as the mycelium was confined to the drop of water, there was no appearance of fructification, and even the tips of the filaments were scarcely incrassated. There was not, then, the slightest intimation to what genus of fungi it belonged; but no sooner had it penetrated through the globule of water into the surrounding air, than a marked change took place. The tips of the short lateral branches became incrassated, and at length globose, and contained a grumous mass, which soon manifested definite spores; shortly after which the vesicle burst, and

the oblong elliptic spores were exposed, still adhering to the tips of the threads, characters belonging manifestly to the genus *Mucor*. The sporangia, however, were of extreme minuteness, not exceeding in diameter that of the individual cells of the onion stem on which they grew; the appearance, indeed, was that of an *Acremonium*, but the globular heads of that genus have not been observed to be sporangia, and were such indeed the case, there would be no character by which to separate it from *Mucor* except the comparative minuteness.* No columella was observed, but it is possible that in so very minute a body, examined in air without the aid of a liquid medium, which every microscopic observer knows to be of the first importance, it might have been overlooked. One or two very minute species have been observed by authors as *Mucor succosus;* by myself, on inspissated sap oozing from the stem of *Aucuba Japonica; Mucor Fimbria*, by Nees, and *Mucor imperceptibilis*, by Schrank; but the two former are far larger productions, and the nature of the latter, which grows under water, is extremely uncertain; and, as Nees von Esenbeck, who has reproduced Schrank's figures, says expressly, requires fresh observations.† There was some peculiar arrangement of the spores within the vesicles, but unfortunately the most perfect sketch of the appearance has been mislaid, and, indeed, the different stages of growth succeeded each other so rapidly, that it was not sufficiently observed. This was the more to be regretted, as it might have thrown some light upon peculiar arrangements in other moulds, especially in *Stilbum piliforme*,‡ Corda, where the spores are disposed somewhat in the fashion of the cells in the globules of *Chara* and *Nitella*. It must be remembered that there is good reason to believe with Corda that each sterigma has the power of producing a succession of spores, which, as they are thrust off by the growth of the new spore, are deposited within the vesicle according to mechanical laws. The specimen furnished no information as to the development of the fallen spores.

It appears, then, that the mildew in the instance under consideration was due to the presence of a most minute microscopic mould, bearing about the same relation in point of size to the larger species, that *Salix herbaeea* does to well-grown trees of *Salix alba*. The mould was in every part of the plant concentrated at numberless points into the form of a Sclerotium, thus confirming directly the views of Léveillé respecting that supposed genus. It was observed above that no form of fructifica-

* I know of no mould so minute except the production described by Nägeli under the generic name of Schinzia penicillata as fructifying in the cells of the roots of an Iris. Linnæa, vol. xvi. p. 278, tab. xi. fig. 2-10.

† Nees von Esenbeck, Syst. d. Pilz. p. 82.

‡ Corda, Ic. Fung., Fasc. III. tab. 2, fig. 41.

tion was visible in the portion of the mycelium which was situated within the drop of water. That moulds when growing in water not only present great differences as to their mycelium, but even as to fructification, appears from the various observations which refer such states to Algæ, or to distinct genera of mucedines and mucorini. *Achlya prolifera*, respecting which Unger* has made such curious observations, is probably a mere anamorphosis of some mould, or if not so, it is at least an aquatic species, and so far anomalous, though scarcely more so than the Algerian *Sphæria Posidoniæ*, Montagne and Durieu, which grows on the shoots of *Posidonia* when yet remaining on their marine bed, and constantly covered by the sea, and is a very highly developed species.

A curious observation was made in the autumn of 1846 by Mr. Hoffman on a mycelium with which the interior of a decaying pear was impregnated. It should be mentioned first, that during that autumn the leaves of many Apple and Pear trees at Margate were covered with a white flocculent fungus, which was, however, never seen in fruit. All the fruit of these particular trees rotted; and though no fungus appeared externally, the cells of the fruit exhibited very clearly a jointed mycelium. An extremely minute portion of this, cleared as much as possible from the cellular substance of the matrix, was subjected to precisely the same treatment as that observed in the examination of the onion mildew. It shortly began to grow and spread in all directions, but so long as it was confined to the fluid no normal fructification appeared; the articulations of the threads, however, contained oblong-elliptic grains, which were soon dispersed in the fluid, after the fashion of the reproductive bodies in *Bryopsis* and some *Confervæ*. They possessed at first a slight molecular motion, which soon subsided; and when they became stationary they germinated, and gave rise to jointed threads, similar to those of the parent mycelium. As soon, however, as the flocci penetrated into the surrounding air, a very different sort of fructification appeared, by which the mould was easily recognised as *Penicillium candidum*, Grev. The true spores were of the same form and size as those which had been developed within the threads in water, and it should be observed that no external fruit had appeared when the grains of the joints were first dispersed, or even till after they had germinated. Precisely the same results were exhibited in a second experiment. It was found afterwards that, even *in situ*, as might be expected from the abundant moisture of the decayed fruit, the reproductive granules were produced

* Linnæa, vol. xvii. p. 129.

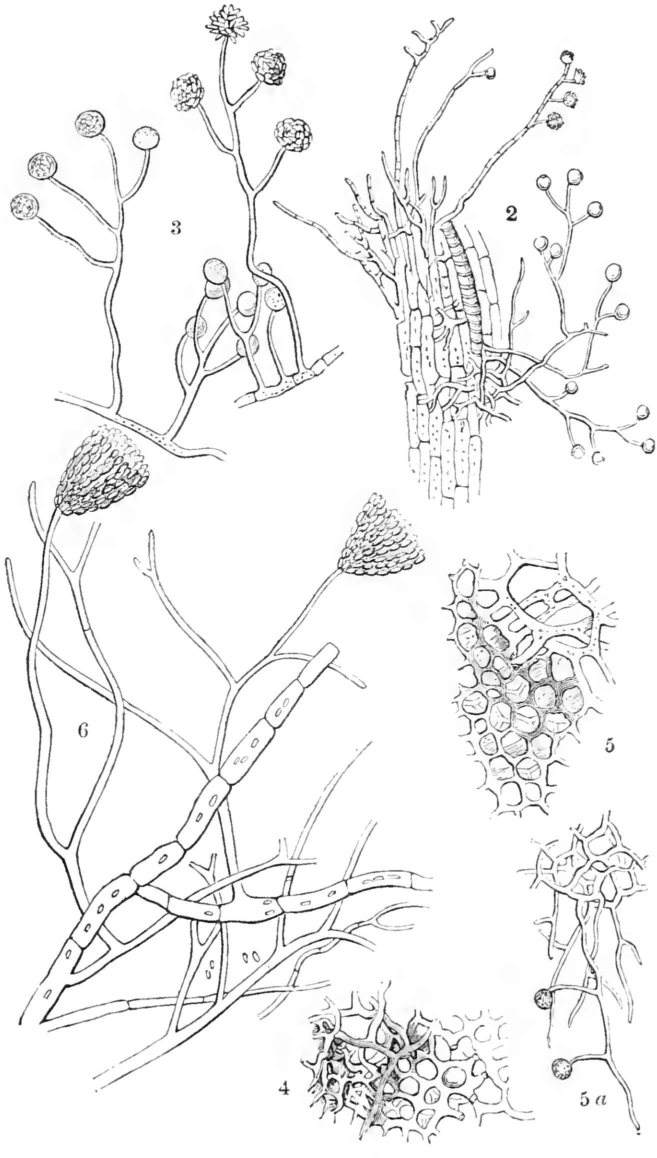
within the threads and dispersed in the fruit, thus extensively and rapidly propagating the disease. There is no evidence, indeed, to show what was the nature of the mould on the leaves, or whether it was identical with that produced by the mycelium; but the fact is interesting, as suggesting further observation, and as tending to the establishment of the truth which is so reluctantly admitted by many, that fungi are capable of producing extensive disease as well in vegetable as in animal tissues.

The observation is further important, as showing one way in which fungi may be extensively propagated in the tissue of phænogamous plants, when once the mycelium of a mould has been established, for the reproductive bodies produced within the threads, where there was no cavity filled with air proper for the development of the true fruit, might be carried by the means of the intercellular passages to any part of the plant; and it does not follow that these secondary reproductive bodies should always be of the same size as the spores.

That disease is propagated from one plant to another appears very clear from the two following observations, which I shall give nearly in Mr. Hoffman's own words. A turnip was observed, whose leaves were covered with a species of *Oidium*. A fine half-grown turnip in perfect health happened to be near it, and pushed imprudently one of its leaves in contact with the sickly plant. When first observed, a narrow white velvety border was visible on the edge of the healthy leaf, just where it touched the diseased one. The parasite spread from this border over the whole leaf in a few days, and the poor young turnip fell a sacrifice to bad company, for both decayed.

The second observation was connected with the grape mildew, which I have described in the Gardener's Chronicle, 1847. Some healthy plants of *Chrysanthemum Indicum* were placed under the vines infested with *Oidium Tuckeri*, and in a short time every plant was covered with the same fungus. This suggested further experiment. Some self-sown potato plants, of an early variety, entirely free from *Botrytis*, were potted off, and placed where the *Chrysanthemum* became diseased. All throve admirably, without exhibiting any appearance of mildew. The grape mould had no effect upon them. But when the leaves of a potato infected with Botrytis were shaken over one particular plant, in a few days it was mildewed, the plant became sickly, and eventually died.

The bearing of all these facts on the possibility of the extensive destruction of plants by parasitic moulds is evident, and suggests the wisdom of extensive series of well-conducted experiments. These, if made without prejudice, or at least with perfect impartiality, would, I am convinced, lead to most important results, which would amply repay the pains bestowed upon them.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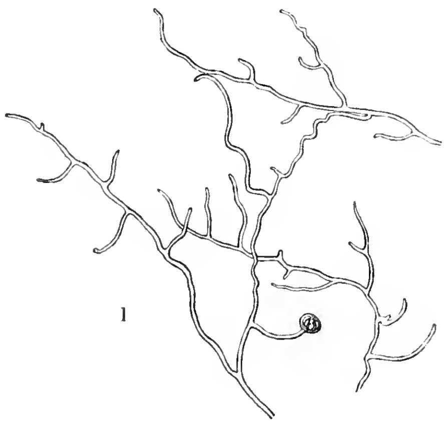
Attention should be directed first to the phenomena of growth and propagation, and then to the discovery of some means of prevention or of cure.

I have said before that onion mildew does not in my opinion arise from bad cultivation, or from peculiarities of soil, though it may be aggravated by either. The probability is that the remedy must be directed to the seeds. It is, however, possible that all our pains may in the end be baffled by these minute plagues. "Few things are more wonderful or more humiliating to man than his powerlessness in contending against God's army of small things, insects and fungi: he can subdue the monster of the sea, and the wild beast of the forest, but is conquered in his turn by a tiny fly or a few grains of dust."



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NOTE.—The species of Mucor may be thus characterized:—

Mucor *subtilissimus*, n. sp.; mycelio repente; floccis fertilibus ramosis, ramis brevibus patentibus sporangio omnino microscopico terminatis; vesiculis demum evanidis: sporis oblongo-ellipticis.

Fig. 1. Mycelium of Mucor subtilissimus highly magnified. A single branchlet has pushed into the air, and has produced a sporangium.

Fig. 2. Slice from the stem of a diseased onion sending off abundant fructifying shoots, magnified to the same degree as the last.

Fig. 3. A portion more highly magnified, showing the various states of fructification.

Fig. 4. Transverse section of the Sclerotium, showing the dark outer coat of two contiguous masses, and the mycelium between them. The lighter portion represents the tissue of the interior of one of the masses.

Fig. 5. Slice from surface of Sclerotium more highly magnified, with the mycelium springing from it.

a. Mycelium springing from substance of Sclerotium.

Fig. 6. Penicillium candidum, exhibiting external and internal fruit.

XVI.—*Observations made with reference to the Temperature of the Earth in the Garden of the Horticultural Society at Chiswick.* By Robert Thompson.

Whilst attention has been directed for many years to the temperature of the air, that of the earth has been comparatively but little noticed, either at home or abroad. That it is necessary to understand the one as well as the other will, I presume, be readily admitted; for the fitness of soils to produce certain crops frequently depends on the condition of the subsoil as regards temperature. What constitutes a good condition or a bad condition in this respect cannot be exactly known until determined by thermometrical experiments. In a favourable soil and climate, vegetation may be seen thriving well; in apparently similar circumstances it often thrives badly: the cause is generally found to be owing to a cold subsoil. This on a large scale cannot be heated artificially; but in many cases that which occasioned the coldness can be removed. When the temperature of the soil does not rise in due proportion with that of the air in summer, it is generally owing to the presence of spring water; hence the vast improvement consequent on its removal by drainage. This is one mode by which the temperature of the soil can be elevated in the growing season, an effect which is highly deserving of particular investigation by means of ground thermometers.

The following abstract is drawn up from observations made daily in the garden of the Society, with apparatus which it will be proper in the first place to describe.

Two thermometers were constructed by Mr. Newman, the tube of the one being a foot in length below the commencement of the scale, and the other two feet. Both extended a foot above ground when their bulbs were respectively one foot and two feet below the surface. The stems or tubes of the thermometers were enclosed as far as they extended below ground in copper tubes about $\frac{3}{4}$ inch in diameter. To the tops of these the scale was joined by copper straps, continued from the tubes, and along the back of the piece of boxwood on which the scales corresponding to each thermometer were engraved; the copper forming the protecting tubes nowhere touched the thermometers. The cavity between the stem and tube was filled up with finely-powdered charcoal, rendering it as compact as possible by pouring in water occasionally during the process of filling: an inch at top was filled in with clayey loam. The lower extremities of the copper tubes terminated in a point, a little above which, opposite to the bulbs, openings were cut in order that the soil might get in contact with the bulbs. Holes were made in the

ground to admit of the tubes being adjusted to the intended depth, 1 and 2 feet below the surface; and when so adjusted, the earth was filled in, and consolidated by watering.

The situation in which these thermometers were placed was the lawn in the Arboretum, open to the sun, and unsheltered from rain. The grass was kept short, but allowed to grow closely round the ground thermometers. The thermometers indicating the maximum and minimum temperatures in the shade, and which afforded the comparative data in the following tables, were in the same compartment with the ground thermometers and others indicating the degrees of sun-heat and radiation. The whole were enclosed by a wire guard.

The nature of the soil in which the ground thermometers were inserted is a blackish loam, resting on a stratum of yellow loam. The latter is pierced, however, by the common earthworm, in a perpendicular direction, through to the gravel; and by this means a good drainage has been effected, and is still maintained.

1837.		Day of the Month.	Temperature of the Earth.		Day of the Month.	Temperature of the Air.		Day of the Month.	Monthly Mean Temperature of the Air.
			1 Foot.	2 Feet.		Day.	Night.		
June.	Max.	25th	65°	62°	22nd	81°	59°	13th	
	Min.	3rd	54·	53·	8th	56·	35·	3rd	60°·08
	Mean	—	60·11	57·91	—	72·50	47·67	—	
July.	Max.	28th	69·	66·	27th	85·	60·	25th	
	Min.	2nd	62·	62·	1st	66·	37·	1st	63·16
	Mean	—	65·09	63·29	—	75·74	50·57	—	
Aug.	Max.	20th	68·	65·	17th	87·	63·	22nd	
	Min.	31st	58·	59·50	29th	59·	39·	26th	62·53
	Mean	—	63·80	62·97	—	74·03	51·04	—	
Sept.	Max.	20th	62·	60·	19th	72·	60·	17th	
	Min.	28th	54·	56·	27th	60·	35·	26th	55·68
	Mean	—	57·50	58·23	—	65·15	46·22	—	
Oct.	Max.	4th	59·5	58·	2nd	73·	54·	3rd	
	Min.	29th	47·	50·	28th	49·	27·	25th	50·00
	Mean	—	53·01	54·19	—	60·63	39·36	—	
Nov.	Max.	2nd	48·	50·	1st	55·	45·	10th	
	Min.	30th	40·	44·	8th	33	22·	8th	40·22
	Mean	—	43·23	46·01	—	47·89	32·55	—	
Dec.	Max.	26th	46·	46·	19th	55·	48·	24th	
	Min.	16th	38·	41·	7th	34·	24·	3rd	41·38
	Mean	—	42·16	43·35	—	46·61	36·14	—	

1838.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	1st	46°·	46°·	29th	49°·	41°·	2nd	
	Min.	20th	33·	35·	20th	11·	−4½	19th	27°·79
	Mean	—	36·19	39·03	—	32·87	22·72	—	
Feb.	Max.	28th	38·	37·50	28th	53·	40·	24th	
	Min.	9th	32·5	35·	15th	32·	14·	12th	33·76
	Mean	—	33·98	35·66	—	39·89	27·64	—	
Mar.	Max.	30th	46·	44·	29th	62·	46·	29th	
	Min.	1st	39·5	38·5	22nd	40·	24·	15th	42·16
	Mean	—	41·48	41·46	—	51·45	32·87	—	
April.	Max.	12th	49·	47·	11th	69·	49·	6th	
	Min.	3rd	42·	43·	1st	45·	16·	1st	44·06
	Mean	—	44·90	44·85	—	53·33	34·80	—	
May.	Max.	31st	57·	53·50	8th	78·	50·	1st	
	Min.	1st	46·	45·	23rd	48·	26·	15th	52·27
	Mean	—	52·11	50·72	—	64·19	40·35	—	
June.	Max.	25th	64·5	60·5	24th	83·	58·	16th	
	Min.	10th	56·	55·	7th	64·	35·	8th	59·89
	Mean	—	59·70	57·40	—	70·83	48·96	—	
July.	Max.	12th	68·	65·50	13th	84·	60·	10th	
	Min.	27th	61·	61·	22nd	64·	40·	24th	62·78
	Mean	—	64·53	62·82	—	74·48	51·09	—	
Aug.	Max.	14th	66·	63·50	28th	82·	61·	12th	
	Min.	26th	61·	60·	22nd	66·	38·	30th	61·58
	Mean	—	63·37	62·00	—	72·42	50·74	—	
Sept.	Max.	2nd	63·	62·	4th	76·	56·	14th	
	Min.	28th	54·50	56·	8th	56·	34·	10th	56·16
	Mean	—	58·55	59·08	—	67·06	45·26	—	
Oct.	Max.	1st	56·50	56·50	20th	66·	54·	21st	
	Min.	14th	49·	51·	13th	44·	26·	14th	50·48
	Mean	—	52·53	53·35	—	57·58	43·38	—	
Nov.	Max.	1st	49·	51·	7th	61·	49·	21st	
	Min.	27th	38·	42·	25th	39·	23·	24th	42·49
	Mean	—	44·08	46·40	—	48·90	36·09	—	
Dec.	Max.	2nd	45·	46·	1st	56·	48·	1st	
	Min.	29th	37·	40·	9th	35·	21·	25th	38 67
	Mean	—	40·88	42·85	—	44·64	32·71	—	

1839.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	3rd	42°·	42°·	6th	53°·	43°·	1st	
	Min.	30th	36·	39·	30th	34·	17·	29th	37°·85
	Mean	—	38·98	41·20	—	44·06	31·64	—	
Feb.	Max.	10th	45·	43·	14th	53·	49·	8th	
	Min.	3rd	35·	38·	1st	36·	20·	1st	40·65
	Mean	—	40·20	40·96	—	47·64	33·67	—	
Mar.	Max.	29th	45·	45·	24th	58·	45·	23rd	
	Min.	10th	36·	39·	5th	35·	20·	9th	41·78
	Mean	—	41·46	41·93	—	48·32	35·25	—	
April.	Max.	31st	51·	49·	30th	73·	46·	18th	
	Min.	7th	38·	41·	3rd	36·	24·	6th	44·44
	Mean	—	44·43	44·36	—	52·63	36·26	—	
May.	Max.	31st	57·50	55·	1st	73·	54·	20th	
	Min.	16th	48·50	50·	14th	52·	28·	15th	52·45
	Mean	—	53·71	52·56	—	64·48	40·42	—	
June.	Max.	21st	66·	62·	18th	84·	59·	20th	
	Min.	3rd	56·	56·	29th	51·	40·	30th	60·16
	Mean	—	61·03	59·03	—	69·63	50·70	—	
July.	Max.	7th	66·	62·50	13th	81·	61·	17th	
	Min.	1st	58·	58·	27th	62·	45·	1st	61·74
	Mean	—	62·32	61·12	—	70·58	52·90	—	
Aug.	Max.	4th	67·	63·50	3rd	85·	56·	28th	
	Min.	22nd	59·	60·	19th	61·	37·	20th	61·41
	Mean	—	63·00	62·00	—	72·25	50·58	—	
Sept.	Max.	11th	63·	61·50	10th	78·	61·	8th	
	Min.	30th	55·	57·	17th	62·	36·	28th	57·71
	Mean	—	58·96	59·30	—	67·36	48·06	—	
Oct.	Max.	5th	57·	57·50	11th	71·	56·	8th	
	Min.	31st	46·	49·	31st	42·	35·	19th	50·88
	Mean	—	53·24	54·42	—	58·58	43·19	—	
Nov.	Max.	18th	52·	51·50	17th	57·	50·	9th	
	Min.	28th	43·	46·	27th	36·	21·	26th	45·56
	Mean	—	48·06	49·23	—	51·06	40·06	—	
Dec.	Max.	24th	48·50	47·	23rd	57·	48·	23rd	
	Min.	9th	39·	43·	8th	35·	21·	29th	40·30
	Mean	—	42·84	44·51	—	45·35	35·25	—	

1840.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Feb.	Max.	17th	43°·50	44°·	7th	53°·	45°·	11th	
	Min.	25th	36·	39·	20th	33·	24·	22nd	39°·30
	Mean	—	40·57	41·86	—	44·96	33·65	—	
Mar.	Max.	19th	42·	42·	9th	56·	43·	30th	
	Min.	8th	36·	39·	26th	40·	19·	5th	39·70
	Mean	—	39·24	41·71	—	48·06	31·35	—	
April.	Max.	30th	56·50	53·	28th	81·	46·	21st	
	Min.	1st	42·	42·	4th	51·	25·	9th	49·83
	Mean	—	47·66	46·60	—	64·80	34·86	—	
May.	Max.	31st	60·	57·	31st	80·	55·	24th	
	Min.	22nd	52·	53·	11th	55·	34·	19th	56·14
	Mean	—	55·90	54·67	—	66·97	45·32	—	
June.	Max.	14th	67·	64·50	1st	84·	59·	11th	
	Min.	5th	58·	58·	19th	62·	41·	7th	60·94
	Mean	—	62·03	60·40	—	71·96	49·93	—	

In July, 1840, the ground thermometers were employed for the purpose of experiments which were being made respecting the soil in the bed of the great conservatory. In the autumn of 1843, after having been several months replaced in the arboretum, they were accidentally broken, and the observations were interrupted till the commencement of 1844.

1843.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
June.	Max.	28th	61°·	60°·	27th	76°·	59°·	19th	
	Min.	14th	56·	56·	9th	63·	38·	4th	56°·99
	Mean	—	56·55	55·87	—	66·76	47·13	—	
July.	Max.	17th	67·	64·	5th	88·	59·	3rd	
	Min.	1st	59·	59·	8th	62·	40·	23rd	61·88
	Mean	—	62·61	61·79	—	71·64	52·12	—	
Aug.	Max.	18th	68·	66·	18th	84·	61·	19th	
	Min.	3rd	61·	61·	2nd	62·	42·	6th	63·36
	Mean	—	64·16	63·60	—	73·96	52·77	—	

1844.		Day of the Month.	Temperature of the Earth. 1 Foot.	2 Feet.	Day of the Month.	Temperature of the Air. Day.	Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	1st	44°·	46°·	5th	54°·	44°·	29th	
	Min.	17th	38·	41·	2nd	37·	14·	2nd	38°·79
	Mean	—	40·38	42·51	—	45·84	31·74	—	
Feb.	Max.	1st	41·	42·	29th	53·	43·	29th	
	Min.	13th	35·	39·	13th	32·	19·	5th	36·49
	Mean	—	37·75	39·70	—	44·44	28·55	—	
Mar.	Max.	31st	46·	46·	29th	63·	46·	26th	
	Min.	6th	38·	40·	4th	41·	19·	5th	42·46
	Mean	—	41·55	42·14	—	51·06	33·87	—	
April.	Max.	27th	54·50	53·	9th	73·	48·	15th	
	Min.	8th	46·	46·	5th	58·	25·	7th	51·06
	Mean	—	50·56	49 83	—	66·60	35·53	—	
May.	Max.	14th	58·	56·	9th	78·	52·	11th	
	Min.	30th	52·50	53·	27th	56·	32·	17th	54·05
	Mean	—	54·77	54·34	—	65·42	42·68	—	
June.	Max.	24th	68·	64·	23rd	91·	67·	24th	
	Min.	1st	53·	53·	2nd	61·	40·	4th	62·95
	Mean	—	61·36	59·38	—	76·60	49·30	—	
July.	Max.	25th	69·	65·50	25th	92·	62·	25th	
	Min.	5th	61·	61·	6th	65·	42·	16th	64·30
	Mean	—	63·61	62·48	—	76·42	52·19	—	
Aug.	Max.	1st	62·	63·	31st	80·	60·	19th	
	Min.	16th	58·	59·	13th	65·	38·	23rd	59·69
	Mean	—	60·12	60·58	—	71·68	47·71	—	
Sept.	Max.	8th	63·	62·	1st	84·	61·	3rd	
	Min.	30th	52·	56·	29th	59·	30·	29th	58·91
	Mean	—	59·16	59·76	—	70·50	47·33	—	
Oct.	Max.	5th	57·	57·	3rd	71·	55·	12th	
	Min.	30th	47·	49·	28th	47·	29·	27th	50·17
	Mean	—	51·44	53·31	—	60·09	40·26	—	
Nov.	Max.	19th	49·50	50·	16th	60·	51·	18th	
	Min.	28th	41·	44·	30th	40·	22·	26th	43·58
	Mean	—	46 45	45·85	—	50·53	36·63	—	
Dec.	Max.	1st	41·	44·	29th	49·	40·	18th	
	Min.	24th	35·	38·	6th	30·	14·	5th	33·27
	Mean	—	36·95	39·79	—	37·64	28·90	—	

1845.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	15th	42°·	42°·50	6th	54°·	44°·	11th	
	Min.	31st	36·	39·	30th	34·	19·	28th	38°·69
	Mean	—	39·90	40·93	—	45·90	31·48	—	
Feb.	Max.	28th	39·50	39·	26th	52·	37·	25th	
	Min.	21st	34·	36·	12th	32·	–3·	11th	33·07
	Mean	—	35·64	37·57	—	41·43	24·71	—	
Mar.	Max.	28th	44·50	43·	31st	63·	47·	27th	
	Min.	18th	34·	36·	13th	25·	13·	13th	38·49
	Mean	—	37·79	38·37	—	45·51	31·48	—	
April.	Max.	30th	52·	50·	23rd	72·	52·	25th	
	Min.	12th	42·	43·	9th	47·	22·	6th	48 41
	Mean	—	45·71	45·40	—	60·20	36·63	—	
May.	Max.	31st	53·	52·	31st	69·	49·	28th	
	Min.	7th	48·	49·	7th	50·	27·	5th	50·04
	Mean	—	50·38	50·31	—	59·74	40·35	—	
June.	Max.	16th	65·50	62·	12th	85·	60·	15th	
	Min.	1st	55·	53·	6th	67·	40·	9th	62·14
	Mean	—	60·58	58·41	—	74·56	49·73	—	
July.	Max.	8th	66·	64·50	3rd	84·	60·	6th	
	Min.	31st	59·	60·	23rd	58·	43·	29th	61·43
	Mean	—	62·11	61·40	—	71·03	51·84	—	
Aug.	Max.	9th	62·	61·50	5th	75·	55·	4th	
	Min.	17th	57·	58·	16th	61·	39·	21st	59·30
	Mean	—	60·22	59·86	—	69·42	49·19	—	
Sept.	Max.	1st	61·	60·50	9th	78·	55·	17th	
	Min.	25th	53·	55·	23rd	54·	30·	23rd	52·60
	Mean	—	56·31	57·45	—	64·57	40·63	—	
Oct.	Max.	4th	56·	56·	14th	76·	58·	2nd	
	Min.	27th	46·	49·50	26th	50·	27·	23rd	49·96
	Mean	—	51·12	52·45	—	60·03	39·90	—	
Nov.	Max.	1st	49·50	50·50	6th	62·	49·	7th	
	Min.	25th	41·	45·	4th	42·	20·	3rd	44·26
	Mean	—	46·20	47·73	—	52·80	35·73	—	
Dec.	Max.	1st	45·	47·	30th	54·	42·	16th	
	Min.	24th	39·	41·50	13th	36·	19·	7th	36·73
	Mean	—	41·48	43·47	—	40·96	32·51	—	

1846.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	26th	47°	46°	22nd	56°	50°	21st	43°·38
	Min.	6th	37·	41·	12th	36·	21·	5th	
	Mean	—	42·47	43·35	—	49·38	37·38	—	
Feb.	Max.	25th	48·	47·	28th	64·	50·	23rd	43·32
	Min.	12th	38·	41·	10th	41·	22·	10th	
	Mean	—	43·23	44·07	—	51·07	35·57	—	
Mar.	Max.	1st	48·	47·50	31st	62·	47·	3rd	43·43
	Min.	21st	41·	44·	20th	44·	20·	20th	
	Mean	—	44·47	45·55	—	53·80	33·06	—	
April.	Max.	17th	50·	49·50	12th	65·	49·	15th	47·38
	Min.	1st	46·	45·	7th	48·	27·	20th	
	Mean	—	47·73	47·81	—	57·10	37·66	—	
May.	Max.	31st	60·	59·	31st	81·	53·	25th	56·16
	Min.	1st	50·	50·	20th	60·	34·	11th	
	Mean	—	55·38	54·55	—	68·29	44·03	—	
June.	Max.	18th	68·	66·	19th	93·	62·	20th	66·46
	Min.	1st	61·50	59·	24th	67·	43·	2nd	
	Mean	—	64·73	63·10	—	81·13	51·80	—	
July.	Max.	31st	67·	65·50	5th	95·	66·	4th	65·95
	Min.	9th	63·	63·	8th	68·	45·	10th	
	Mean	—	64·40	63·84	—	77·61	54·29	—	
Aug.	Max.	2nd	67·50	66·50	1st	92·	64·	6th	64·16
	Min.	23rd	62·	63·	20th	64·	44·	13th	
	Mean	—	64·74	64·53	—	74·29	54·03	—	
Sept.	Max.	10th	64·	63·50	7th	83·	60·	10th	60·79
	Min.	30th	55·	58·50	30th	63·	36·	29th	
	Mean	—	61·28	61·63	—	72·46	49·13	—	
Oct.	Max.	3rd	57·50	58·	1st	67·	55·	2nd	50·37
	Min.	29th	49·	51·	31st	44·	29·	23rd	
	Mean	—	53·18	55·19	—	57·97	42·77	—	
Nov.	Max.	4th	51·	52·	3rd	61·	49·	2nd	44·60
	Min.	30th	42·	47·	30th	34·	16·	12th	
	Mean	—	48·03	49·61	—	50·60	38·60	—	
Dec.	Max.	1st	41·	45·	21st	49·	42·	20th	31·25
	Min.	31st	36·	38·50	31st	28·	11·	13th	
	Mean	—	38·21	41·06	—	37·84	24·67	—	

1847.		Day of the Month.	Temperature of the Earth. 1 Foot.	Temperature of the Earth. 2 Feet.	Day of the Month.	Temperature of the Air. Day.	Temperature of the Air. Night.	Day of the Month.	Monthly Mean Temperature of the Air.
Jan.	Max.	28th	41°	41°	26th	50°	41°	26th	
	Min.	21st	35·	37·	17th	31·	19·	14th	34°·24
	Mean	—	36·85	38·66	—	39·35	29·14	—	
Feb.	Max.	23rd	42·	42·	17th	57·	47·	17th	
	Min.	14th	34·50	37·	8th	30·	4·	9th	34·80
	Mean	—	37·60	39·03	—	42·17	27·43	—	
Mar.	Max.	28th	45·	44·	26th	64·	39·	25th	
	Min.	1st	36·	38·	11th	36·	7·	10th	40·11
	Mean	—	40·22	41·03	—	50·77	29·45	—	
April.	Max.	29th	48·	48·	12th	64·	47·	11th	
	Min.	3rd	40·	42·	2nd	44·	20·	16th	44·28
	Mean	—	44·70	45·05	—	55·03	33·53	—	
May.	Max.	29th	62·	59·50	23rd	89·	59·	28th	
	Min.	1st	48·	48·	3rd	53·	30·	2nd	56·88
	Mean	—	54·60	53·14	—	69·16	44·61	—	
June.	Max.	4th	62·	61·	1st	79·	55·	29th	
	Min.	17th	57·	57·	10th	60·	36·	6th	58·46
	Mean	—	59·45	58·91	—	69·20	47·73	—	
July.	Max.	15th	68·	65·	14th	93·50	61·	10th	
	Min.	3rd	60·	60·	2nd	64·	43·	4th	65·84
	Mean	—	64·00	62·60	—	78·82	52·87	—	
Aug.	Max.	3rd	66·	66·50	1st	91·50	62·	18th	
	Min.	25th	59·	61·	23rd	61·	38·	3rd	62·47
	Mean	—	62·80	62·76	—	74·92	50·03	—	
Sept.	Max.	1st	60·	61·	10th	75·	58·	12th	
	Min.	29th	52·	54·	18th	58·	28·	27th	53·40
	Mean	—	55·88	57·02	—	64·80	42·00	—	
Oct.	Max.	13th	55·	55·	12th	72·	53·	9th	
	Min.	27th	48·50	51·	24th	53·	26·	25th	52·12
	Mean	—	52·77	53·74	—	60·58	43·67	—	
Nov.	Max.	10th	53·	53·	1st	65·	52·	7th	
	Min.	21st	42·	46·	18th	42·	19·	18th	44·61
	Mean	—	47·96	49·71	—	52·33	36·90	—	
Dec.	Max.	4th	47·	47·50	3rd	57·	49·	10th	
	Min.	29th	40·	42·	21st	35·	25·	1st	41·09
	Mean	—	44·14	45·67	—	47·00	35·19	—	

Average Temperature, deduced from the Observations made in 1838, 1839, 1844, 1845, 1846, and 1847.

MONTHS.	EARTH.		AIR.		
	1 Foot.	2 Feet.	Max.	Min.	Mean.
	°	°	°	°	°
JANUARY . .	39·13	40·94	42·90	30·68	36·79
FEBRUARY . .	38·06	39·49	44·44	29·59	37·01
MARCH . . .	41·16	41·74	50·15	32·66	41·40
APRIL . . .	46·17	46·21	57·48	35·73	46·60
MAY . . .	53·49	52·60	65·21	42·07	53·64
JUNE . . .	61·14	59·37	73·66	49 70	61·68
JULY . . .	63·49	62·37	74·82	52·53	63·67
AUGUST . . .	62·37	61 95	72·49	50·38	61·43
SEPTEMBER. .	58·35	59·04	67·79	45·40	56·59
OCTOBER . .	52·38	53·74	59·14	42·19	50·66
NOVEMBER . .	46·79	48·09	51·03	37·33	44·18
DECEMBER . .	40·75	42·89	42·24	31·54	36·89
Mean . .	50·27	50·70	58·44	39·98	49·21

From the data in the preceding tables it appears that the average mean temperature of the earth for the years 1838, 1839, 1844, 1845, 1846, and 1847, was, at 1 foot below the surface, 50° 27′; and at 2 feet below the surface, 50° 70′. The difference of these is therefore scarcely half a degree, and this was in favour of the greater average warmth at the lower depth.

The mean temperature of the air in the shade for the same period was 49° 21′. Compared with this, the temperature at 1 foot deep averaged nearly 1 degree warmer. The average temperature at 2 feet deep was nearly 1½ degree above that of the air.

The highest temperature indicated by the ground thermometer at 1 foot deep was 69°, on the 25th and 26th of July, 1844; and the lowest 32½°, on the 9th of February, 1838. The range of temperature was consequently 36½ degrees. At 2 feet deep the highest temperature was 66½°, August 1st, 1847; and the lowest 35°, on various days between the 21st of January and the 9th of February, 1838. The range was 31½ degrees, being less by 5 degrees than that of the 1 foot deep thermometer.

The highest atmospheric temperature in the shade, during the above period, was 95°, July 5th, 1846; and the lowest 4½° below zero, January 20th, 1838. Consequently the range of tem-

perature between these extremes was $99\frac{1}{2}$ degrees. This exceeded the range at 1 foot deep by 63 degrees. The maximum temperature of the air exceeded the maximum at 1 foot deep by $30\frac{1}{2}°$; and the minimum temperature of the air fell 37° below the minimum at 1 foot deep. Hence the temperature of the air fell more beneath the lower limit of the range of ground temperature than it rose above the higher limit of the same.

The hottest year as regards the temperature of the earth, 1846, afforded a mean temperature of 52° 32′ at 1 foot deep; and 52° 85′ at 2 feet deep. In the coldest year, 1845, the mean temperature at 1 foot deep was 48° 95′; and at 2 feet deep 49° 44′. The respective differences of the two thermometers in these hottest and coldest years were 3° 37′ at 1 foot deep, and 3° 41′ at 2 feet. The mean temperature of the air was 51° 45′ in 1846, and 47° 92′ in 1845; the difference being 3° 53′.

On the average of the six years the earth is coldest in February, and warmest in July. The mean temperature of the air is also highest in July, but it is lowest in January. Throughout the months the gradations of temperature are not uniform. The monthly progression is as follows:—

Temperature increases.

	Feb.	Mar.	April.	May.	June.	July.
	°	°	°	°	°	°
1 foot deep	(Lowest)	3·10	5·01	7·32	7·65	2·35
2 feet deep	(Lowest)	2·25	4·47	6·39	6·77	3·00
Air	0·22	4·39	5·20	7·04	8·04	1·99

Temperature decreases.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
	°	°	°	°	°	°	°
1 foot deep .	1·12	4·02	5·97	5·59	6·04	1·62	1·07
2 feet deep .	0·42	2·91	5·30	5·65	5·20	1·95	1·45
Air	2·24	4·84	5·93	6·48	7·29	0·10	—

XVII.—*On the most economical mode of forcing Seakale.* By Robert Errington, Gardener to Sir Philip de Malpas Grey Egerton, Bart., M.P., F.H.S.

(Communicated Jan. 29, 1848.)

One of the best features of modern horticulture is the simplicity, and of course economy, with which many of our finer garden productions can now be obtained. This may not be sufficiently obvious at first sight, but a just comparison of the products of a highly cultivated modern garden of any pretensions, with one of some twenty or thirty years ago, will bear ample testimony to

the correctness of the assertion. Besides, economy is not the only affair; there is no small consolation to be derived from the certainty, with few exceptions, of success, where attention is duly paid—not to mere prescription—but to a strict adherence to those principles which nature has established, a due observance of which is the only satisfactory ground of success. These things, moreover, proceed amidst an enormous increase of business on the hands of the modern gardener, whose work, both with head and hands, may be fairly said to have doubled within the last thirty years.

I would here beg to draw attention to an improved mode of forcing seakale, which is one of our most delicious forced vegetables; indeed, with abundance of this, mushrooms, and asparagus, aided by a clever succession of the various broccolis and cauliflowers, the most fastidious French or Italian cook may be kept in temper during the dull winter months. The high price of seakale, as quoted in our market returns for the months of December and January, sufficiently attests the fact that either the general method of cultivation is unnecessarily expensive, or that it has not become sufficiently simplified. The latter is my view of the case; and I beg to submit a course of culture which I have practised for some time, with little trouble or expense, and much certainty; so much so, that I have this winter been able to supply at least four dishes per week, from the middle of November (on an average), in a continuous way, from a bed not ten feet long by two feet in width.

By the old system of forcing the roots where they grow in the open ground, the labour and hot manure required is enormous; and in the consumption of the latter article, it proves a tiresome opponent to the early cucumber bed, or the pine pit. Moreover, a host of huge bleaching pots must be procured, at a very high charge, and of these a very considerable portion becomes cracked or broken up in a very short period. In addition to this, there is much uncertainty in the supply as well as character of the article, some of it soon becoming "drawn" and worthless.

I will pass by the process of raising the seedlings with merely observing that they are best raised in drills, well nourished. In preparing the soil for the final planting, much regard should be paid to the staple or texture, independently of the question of manuring. The kale being a seaside plant, and growing for the most part in loose sands, is ill adapted to withstand sour and stubborn clay soils. Where the ground is of this character, means should be taken to pulverise it, by trenching, fallowing, and the introduction of abundance of sand, road scrapings, and cinder ashes; and the rows of kale should be elevated several inches above the ordinary ground level. The soil duly pre-

pared and well manured, my practice is to strew a heavy coating of salt over the surface. The plants—one year's seedlings—may be placed in rows one yard apart, and about two feet apart in the row: I always, however, put two plants in each station, side by side. Any time from the end of November until the beginning of February is eligible; and the young plants should be taken up in a most careful way, and planted immediately, with all possible root. As soon as planted, I place a mound of old tan over each pair: this coaxes the bud, and preserves it from the withering March winds. The buds do not fairly protrude through the tan covering until the middle of April, by which period the plants have produced fibres, and become capable of enduring both sun and wind without check. Nothing particular is now requisite during the summer, with the exception of a clean course of culture, and the avoidance, during cleaning processes, of all injury to the leaves. By this mode of procedure I invariably produce first-rate crowns for forcing purposes, by one summer's cultivation from the seed-bed; and were I to grow it as a commercial speculation, ever so extensively, I would always break up, force, and replant annually.

I will now proceed to show how these roots should be forced; and, indeed, in this consist the main features of the case. No better place can be found than a mushroom house for this purpose: as, however, some persons do not possess this useful adjunct to good winter gardening, it will be well to observe that any structure which will exclude the severity of the weather will answer. As a guide to the inexperienced in these matters, I will just name the conditions of forcing requisite. First, a steady bottom heat of 75° max.; second, an atmospheric warmth of 60° max.; and, thirdly, total darkness. To this may be added a moist atmosphere at all times: this is particularly essential. Below the floor line of the mushroom-house a sunken bed must be provided, three feet below the floor line if fermenting matter is to be used; and, except as a commercial speculation, fermenting material will be found as safe and economical as pipes or tanks. This three feet excavation, then, when forcing commences, must be filled three-fourths of its depth with hot manure; over this a coating of older material may be placed for the roots to rest upon. The roots for forcing must be taken up with very great care; the less they are broken the finer will the kale be. I place them as thickly as they can stand together, and take care to keep their heads or crowns level; and I fill them up loosely with very old tan or decayed leaf soil as they are placed. No water is allowed when they are thus started to force; this is reserved for a subsequent operation. The fact is, they require a rather strong bottom heat at first to rouse them from

their torpidity; and this once accomplished, the sooner they are cooled down the better, or the kale will become "drawn" and inferior. I commence, therefore, with a bottom heat of 80° for a week, and as soon as I perceive the crowns growing, I immediately reduce the bottom heat by water, bringing it down to about 65°. I seldom apply more than one watering, and I infuse a handful of salt in every large water-pot, sprinkling with a little clean water at last. This watering performs three distinct services: it reduces the bottom heat, it settles the soil around the roots, and by an infusion of salt invigorates the fibres, which by this time are progressing rapidly. If the roots are strong, they will throw up a second "cut" little inferior to the first; indeed, I have had a crop in cut this winter six weeks. It is necessary to elevate a skirting board above the edge of the sunk pit, and a lid must be provided to fit on this; the whole then takes the appearance of a long box or bin, and the lid ensures the darkness necessary, together with a confined damp atmosphere. I introduced my first lot of roots in the last week of October, another lot was introduced about the middle of December, and a third in the second week of January, and the whole of these only occupy eight feet in length, by two feet in width; yet I have produced a dish of first-rate kale whenever required (and this, as I have already said, has been on an average four or five times a-week) constantly since the early part of December. I shall place my fourth and last lot of roots in the bed in the first week of February, after which the open ground beds will carry out the succession until the middle of May. It may be well to observe that the mode of forcing here recommended is a decided benefit to the mushrooms and rhubarb in the same house, for I have supplied the two latter articles in as high perfection and as constant as the kale.

It will be readily seen that a bed or row must be sown annually, and the former year's seedlings annually transplanted; besides this, it is necessary to provide some surplus stock to succeed that which is forced. The best way is to cover this with mounds of tan or soil soon after the leaf has decayed. Those forced, or rather blanched, in the open ground will frequently require cutting back after the crop is taken; when such is the case, the wounded crown should be covered over until it has budded. The transplanted seedling roots will frequently show blossom in the end of May; if that happens, the mere blossom stalk should be pinched out, leaving every possible leaf to keep the root in action. I have known persons cut the heads completely off below all the leaves, but this so paralyzes the root action, that they seldom grow with strength afterwards.

XVIII.—*On the Cultivation of Hardy Heaths.* By David Cameron, C.M.H.S., late Curator of the Botanic Garden, Birmingham.

(Received Feb. 8, 1848.)

The cultivation of hardy heaths does not appear to command much attention, although they are plants well deserving of care, and of being more freely introduced into our gardens, being neat in habit, and flowering, as they do—one or other—during nine months in the year.

The best mode of exhibiting their beauty to advantage is perhaps that of grouping them. The smaller growing kinds are well adapted for edgings to peat-beds. They are by no means particular in regard to choice of soil, growing well in light sandy loam mixed with a very little peat, and in all grades of soil from that to the finest peat. The situation for them may be either wet or dry. The only care required to keep them in health and vigour is, not to allow them to get more than four years of age without replacing them with young plants, with the exception of three species, which will be noticed hereafter. When they get beyond that age, they are liable to have their stems split from bottom to top during winter, which, if it does not entirely kill the plants, very much disfigures them. The first time in which I observed this splitting of the stem was in the severe winter of 1837–8, and I then attributed it to the severity of the weather; but since then I have seen them split in the same manner in November, when there was not above three or four degrees of frost, so that the evil would appear rather to be caused by the peculiar state of the sap in the shoots. In all instances in which splitting has occurred the younger plants remained uninjured—even layers taken off and transplanted in the previous September were perfectly safe.

The keeping up a succession of young plants is readily effected; for all the sorts requiring to be renewed root readily by layers, which, when taken off and transplanted either in September or April, rarely fail. Larger plants may also be transplanted with safety at these two seasons. The old European E. Mediterranea, which makes long shoots every season, is liable to have part of its tender shoots killed back in winter, except in very sheltered situations; while the variety found in Ireland makes short firm shoots, and is never injured by the weather. I shall now enumerate the different species and their varieties, and offer a few observations on their culture.

Erica viridi-purpurea is a handsome-looking variety, pyramidal in form, and grows three or four feet in height. I have

never found it to split. The flowers are inconspicuous, although produced in abundance; but its habit renders it worthy of cultivation. It does not root by layers, and must therefore be increased by cuttings.

E. australis makes a fine tall plant in a sheltered situation, without which it is hardly worth planting. It is increased by cuttings, and is not liable to split in winter.

E. striata is another species which may be allowed to grow to a large size, not being liable to split. It roots readily by layers.

E. carnea, the earliest in flower, often blossoms by the beginning of March. It may be increased readily by layers; and young healthy specimens flower much finer than older plants.

E. ciliaris is a showy species, which often continues in flower until Christmas. It roots freely by layers.

E. scoparia roots freely by layers, but is not worth growing; for it seldom flowers, and when it does the blossoms are inconspicuous.

E. Mackaiana is a fine showy sort, possessing in some degree the leaves and prostrate habit of ciliaris, with the flowers of tetralix.

E. cinerea. Of this there are five or six varieties, of which the white and scarlet are showy.

E. vagans. Of this there are three varieties, which would grow to a considerable size, but that they split in the stems.

E. tetralix. There are three varieties of this, all well worth growing. This, together with the three latter, root freely by layers.

E. mediterranea. The European variety roots freely by layers. The Irish is too brittle to be layered; but when young plants are wanted, they may be obtained by planting some of the older plants six or eight inches deeper, so as to get some of the branches into the soil: the latter will root freely, and may be taken up and divided. This variety is not liable to split.

Calluna vulgaris. Of this there are six or more varieties, of which the double-flowered, the white, and the scarlet are desirable. It roots freely by layers.

Menziesia polifolia. Of the several varieties of this the white is distinct and showy. It roots freely by layers.

XIX.—*Syrian Fruits in the possession of* John Barker, of Suædia.

[A Knightian Medal having been transmitted to John Barker, Esq., of Suædia, for having introduced the Stanwick Nectarine, named at p. 272 of the first volume of our Journal, and which is much the finest Nectarine in cultivation in this country, letters of acknowledgment were addressed by that gentleman to the Vice-Secretary, from which the following very interesting extracts have been made.]

I beg leave to make the Society my humble acknowledgments for the honour which they have been pleased to confer on me, and which I regard as an earnest of the distinguished favour I presume to hope to receive at their hands, when I shall have introduced into England twenty varieties of

1. A new species called "*The Sweet-kernelled Peach*," among which are six varieties of the Nectarine, all of equal, and some of superior value to the "Stanwick Nectarine."
2. A new species of the Apricot with a sweet kernel, called "*Sheker Para*" (bit of sugar) of Ispahan.
3. "*The large sweet White Mulberry of Iran*," from which a syrup is extracted, hardly to be distinguished from syrup made from sugar. It is highly extolled by Sir Alexander Burnes in his 'Travels in Bokhara.'
4. A Plum, with a sweet kernel, called "*Aloo Bokhara*," which is also celebrated by the same traveller. When ripe, its stone is in view through its skin.
5. The famous "*Pomegranate of Tabriz*," without seed, weighing from 50 to 60 ounces.
6. The still more renowned "*Quince*" of most parts of Persia of the same size; which ripens on the tree or in the store, losing all its austerity, and eaten at the dessert like a soft ripe pear.

This wonderful production of nature, and the "*Pomegranate of Tabriz*," are yearly forwarded in presents by caravan to Bagdad.

The Pomegranate is not eaten as are the common sorts, but is squeezed into a goblet, and drunk off like a draught of sherbet; and the highly-perfumed odour of the "*Quince*" is such, in Oriental exaggeration, as that, when there is a single ripe specimen of the fruit in a caravan, every one who accompanies it is conscious of its presence.

In bringing under the notice of the Horticultural Society the foregoing statement, be pleased, Sir, to say that I have now in

Persia, on his travels, my eldest son, Mr. Wm. Burckhardt Barker, who is using his best endeavours to enable me to procure scions of such of the celebrated fruits of Iran as I have failed in obtaining; and who, should his father perish before they are introduced into England, will certainly carry out such of my plans as may be *then* incomplete.

I am to-day packing, to be forwarded to my son-in-law, Mr. Warmington, 100 small Seedling Mulberries, budded with "*The large White Sweet Mulberry of Ispahan.*"

At the same time will be forwarded to that gentleman 500 specimens of "*The Dwarf Apple of Armenia.*" They are all much past the age of puberty, though only 18 inches high. I received them two years ago from Armenia, and they do not appear to have grown at all. They increase slowly in thickness. I have often seen them planted in pots and cases on the terraces in the City of Aleppo, of 40 and 50 years' growth, never exceeding 2 feet in height, nor in the thickness of their stems that of your forefinger, without their ever having been pruned. To test the fact that their diminutiveness was not caused by their being always kept in pots and boxes, I planted out three of full 15 years' growth, and after keeping them 18 years in the open ground, found they had made no perceptible progress. I remarked that they bear best when their roots are cramped. They are very easily propagated, as they make abundant offsets, and take remarkably well from cuttings. Among the trees now sent, there are 17 which were made from cuttings two years ago; and 10, budded, at the same time, with the Ribston Pippin, and other sorts.

XX.—*The Coniferous Plants of Italy, considered in their Geographical and Historical relations.* By J. F. Schouw, F.M.H.S., Professor of Botany in the University of Copenhagen.*

[The great interest taken in Coniferous plants in this country has suggested the translation of the following valuable paper by one of the most distinguished of the Society's Foreign Members.]

I.—PINUS.

1. P. sylvestris. *Linn.*†

This tree occurs frequently in Italy on the southern slope of the Alps, from Frioul to Nice, (as, for example, in the valleys of

* Translated from the French.

† Including P. uncinata, *D. C.*; P. rotunda, *Link.*; P. Mughus, *Jacq.*, not of *Scopoli*.

Tagliamento, Piave, on the Baldo and Legnone mountains, in the Valteline, on the Simplon, Mont Cenis, and at the Col de Tende,) especially in the sandy soil of the valleys of the plain; it is not, however, as abundant as the spruce, silver or larch firs. According to some, it is also found on the northern Apennines; and if this is correct, here ought also to be fixed its southern limit, for the indications of the localities of P. sylvestris in the rest of the Apennines and in Sicily certainly belong to other species.

The upper limit on the southern slope of the Alps is as a mean about 5000 Paris feet above the sea; but in places (as in the Col de Tende) it is as high as 6000 feet, whilst on the northern slope this species of Pinus is not found higher than 4000 feet. As a general rule, it cannot be said to exist lower than 2000 feet above the sea, although it sometimes (the level of Tolmezza) occurs as low as 1000 feet, and even still lower (on the borders of the Tagliamento).

In Scandinavia the northern limit of Pinus sylvestris is at about 69°–70° (Wahlenberg, v. Buch). In the Scandinavian Peninsula, and the north of the eastern plain of Europe, it plays a very important part, for it there constitutes immense forests, and acquires a considerable height. It is also found in Scotland, in the sandy plains of the north of Germany (where it has for the most part been planted), in the mountains of central Europe, and in the valleys on the north of the Alps (Chamouni, the Valais, the valley of the Rhine, the Grisons, the Tyrol, Bavaria, Carinthia).

Towards the west, it is found as far as the Pyrenees (De Candolle, Bentham); whilst, on the contrary, those localities, in the peninsulas of Spain and Greece, where it has been stated to have been found, belong most probably to some other species. It is also said to be found in Northern Asia and on the Caucasus; but it is doubtful whether the species found there is identical with or only analogous to the Pinus sylvestris.

2. Pinus Pumilio. *Hänke.*

This species is found on the southern slope of the Alps towards the east (Tyrol, Baldo, Dorso d'Abramo, Maloggia), as well as towards the west (Simplon, Col de Tende); but the transitory forms of Pinus sylvestris are so common, and the distinctions between them and P. Pumilio are so narrow when there are no cones, that I am not quite certain that some of the above localities do not belong to alpine forms of Pinus sylvestris. P. Pumilio is found beyond the limits of trees, but scarcely higher than 7500 feet, nor lower than 4000 feet; it prefers a swampy soil. This species also grows on the northern slope of the Alps,

is very common on the Carpathians, where it forms a region above that of the Spruce Fir between 4100 and 5600 feet (Wahlenberg); it is also found on the Riesengebirge (Wimmer).

3. Pinus Magellensis. *Provisionally.*

In the highest region of Mount Amaro (the loftiest part of the Majella) there is found a shrubby Pine that appears as if it were different from the Alpine Pumilio. Like the latter, it has its branches bent down, and lying flat upon the ground, with stiff, slightly curved, serrated leaves; its cone is spherical, and still smaller than that of Pumilio; three leaves are moreover often found in the sheath; and lastly, it differs from the Pumilio in having the integuments of its leaf-buds very large, membranous, black at the base, and remaining some time after the leaves are developed. I should be inclined to regard it as an Alpine form of Pinus Laricio, or rather as a species that bears the same relation to P. Laricio as P. Pumilio to P. sylvestris; for a specimen of Laricio from the region of the Beech on the same mountain (Valle dell' Orfenta), given me by Gussone, has cones smaller than usual and short, stiff, slightly curved leaves, to which we must add that three leaves are occasionally found in the sheath of Laricio; but as the leaf-bud of the Pine from Mount Amaro is not pencil-shaped, as is that of P. Laricio, but is, on the contrary, very obtuse, we can scarcely refer it to the latter species. I leave it then to further examinations by the botanists of the country to decide if this shrubby Pine is a separate species, and also if the shrubby Pine from the top of Mount Pollino in Calabria, which I found without cones, belongs to P. Pumilio or to P. Magellensis. Geographical relations would seem in favour of the latter supposition, but the specimens that I collected myself had not long persistent integuments to their buds. The Magellensis is no doubt the tree mentioned as P. Pumilio by Tenore, and as P. Mughus by Gussone.

P. Magellensis begins to appear on Mount Amaro at the upper limit of the Beech, 5600 feet, and is found nearly as high as the top of the mountain, 8300 feet; it there essentially contributes to form a region of shrubs. The dwarf Pine from Mount Pollino extends over a less area between the Serra di Dolcedorme and Mount Pollino, properly so called, at the height of about 6200 feet.

4. Pinus Laricio. *Nouveau Duhamel.*

This species (the Corsican Pine) is very common on Mount Etna, where it forms woods at a height of from 4000 to 6000 feet. It also forms forests, according to Tenore, on the mountain of Sila in Calabria. Gussone found it on the Majella in the

region of the Beech (Valle dell' Orfenta), and we must probably refer to this species what Tenore called first Pinus sylvestris (Floræ Neapolitanæ Prodromus, and Géographie Physique), and afterwards P. nigrescens of the Apennines (Flor. Neap. tom. v.). It is probable, according to Savi, that this tree formerly grew even in the Tuscan Apennines.

It was first discovered in Corsica; but it has since been found in the countries of the south of Europe; for example, on Mount Serrat in Spain (Webb), on Mount Athos (Griesbach), on the Taygetus, Cyllene, and other mountains of Greece (Hawkins), as well as on Mount Ida in Crete and in Phrygia.

The variety called Calabrica by Tenore, of which I obtained specimens from the Botanic Garden at Naples, perfectly corresponds with Duhamel's figure, and with the great tree of this species in the Garden of Plants at Paris. The specimens from Etna and the Majella have shorter and stiffer leaves, and hence ought to be placed between P. Laricio and P. nigricans Host. (Austriaca Hoss.), at least if we judge from the plants brought from the Botanic Garden at Vienna. P. pyrenaica ought, perhaps, to be referred to the same species. From this same garden at Vienna, I also have specimens of P. Pallasiana, Lambert. P. nigricans and P. Pallasiana are both very like P. Laricio, and ought, perhaps, to form but one species with it. If this be so, the species will be found to reach as far as the eastern Alps, excepting, however, the south side, and as far as Hungary: for the P. Pinaster, Rochel, comes within the category. P. Laricio is therefore very much spread over the south of Europe, or if it is regarded as distinct from the species above mentioned, it, as well as species very analogous to it, will be found to occupy this large tract of country. According to the New Duhamel, the P. rubra of Michaux is the same as the Laricio; the latter, then, is found in Canada, and is the only species common to the two continents; this statement, however, requires to be confirmed.

5. Pinus pinaster. *Lambert.*

This species grows in the sandy plains, and on the lower mountains, on the south slope of the northern, and on the western slope of the central, Apennines (Pœgli, Sestri, Spezia, Sarzana, Viareggio, Marchia di Pisa, Monte-Pisano, as well as, according to Savi, in the Maremmes of Sienna, and on the different groups of mountains to the west of the Apennines, and even on Mount Argentaro, according to Brocchi).

It is not found to the south of this mountain, nor before we come to the north of the Apennines. It has been said, it is true, to have grown on the Pianura del Cavallino, near Venice (Pollini, Naccari); but the specimens I found in this locality, which it

may be as well to state had no cones, belong to Pinus Pinea, for the young leaves were ciliated, and the old ones thinner and stiffer than those of P. Pinaster. The variety with shorter leaves and smaller cones seems to prefer the low mountains, whilst the longer leaved, larger coned variety prefers on the contrary sandy plains. The upper limit of this tree is 2800 feet (Mont Pisano).

This tree is found on the French coast of the Mediterranean, forms large forests (partly planted) on the western shores in the Landes, and extends northward as far as Mans. It is also very common on the west of Portugal and the south of Spain. The species of this plant said to have been found in Austria and Hungary seem to have been nothing but P. austriaca: Visiani, however, says it grows in the islands of Brazza, Lesina, Curzola.

6. Pinus Pinea. *Lambert.*

The Stone Pine is found on the sandy coasts of Tuscany and of the States of the Church to the west of the Apennines (Viareggio, Marchia di Pisa, Ostia), on the hills of Genoa and Tuscany (Pegli, Sestri, along the Arno, Prato), usually accompanied by, and frequently forming forests with the Pinus Pinaster. The large forest near Ravenna is, according to Bertolini, formed of this Pine; it is also found in the country of Nice (Allioni), but it is doubtful whether it is really wild in these places, or at all events in some of them. On the Pianura del Cavallino, where this tree is in an unfavourable locality, it is low, and has been probably brought there by chance. It is generally cultivated throughout the whole of Italy, from the foot of the Alps to Sicily. It is not commonly found higher than from 1000 to 1500 feet, but it occurs in the south of Italy as high as 2000 feet (Ariano). It is found, according to Sibthorp, on the sandy coasts of the Western Peloponnesus, in the same conditions probably as in the middle of Italy; it is also met with in the island of Meleda (Visiani). Cultivated, it is found on all the shores of the Mediterranean.

7. Pinus Halepensis. *Lambert.*

This species is not found to the north of the Apennines; but it is very common to the east and west of these mountains, as well as in Sicily (Genoa, Sestri, Nervi and Chiavari, Carara, Monte-Nero, Terni, Caduta delle Marmore, valley of Nera, Spoleto, between Otricoli and Narni, Capri, Pesto; according to specimens communicated by Giordano, Gargano, Terranova, on the southern coast of Sicily, near Comiso, as appears from specimens sent by Tineo, and on the Madonie, according to the communications of Tineo and Gasparini). It grows both on sand

and on rocks, but best on the latter; its upper limit is 2000 feet at the outside (the Somma between Terni and Spoleto).

This plant belongs to the flora of the Mediterranean; it is first found in the south of France (Fréjus. Toulon), according to De Candolle and Loiseleur; Mont-Ventoux (Martins), then in the islands and on the continent of Dalmatia (Visiani), in Greece (Sibthorp, Hawkins, Chaubard), in Syria (Loudon), in the north of Africa (Desfontaines), and in Spain (Cook).

8. Pinus Brutia. *Tenore.*

The Calabrian Pine approaches, rather too near perhaps, P. Halepensis; but it differs from it in these respects: its cones are nearly sessile, the tops of their scales rough, and its leaves are longer than those of P. Halepensis.

It grows, according to Tenore, in Calabria, especially on the Aspromonte, at a height varying from 2400 to 3600 feet. I have specimens from Aspromonte, for which I am indebted to Giordano, and others from the botanic garden at Naples, grown from seeds brought from Calabria.

It is not yet known with any certainty whether this tree is found out of Italy or not.*

9. Pinus Cembra. *Linn.*

This tree is found in the high regions of the Alps, from the Tyrol to Mont Cenis, but scattered (Maloggia, Val Engadina, Splügen, Mont Cenis), between 4000 and 6500 feet.

It is also found on the northern slope of the Alps, from Austria to Savoy and Dauphiné. It occurs also in the Carpathian mountains (Wahlenberg) and on the Altaï (Ledebour). It is doubtful, in my opinion, if the Cembra which is found in eastern Siberia is different from the present one.

II.—ABIES.

1. Abies excelsa. *D. C.*

The Spruce Fir is very common, and forms forests on the Alps from east to west (Nanus, Saifnita, Tagliamento, Piave, Baldo, Dorso d'Abramo, Stilfserjoch, Legnone, Valtelina, Bregaglia, Splügen, St. Gothard, Simplon, Mont-Cenis, and, according to Martins, on the northern slope of Mont-Ventoux). It is principally found at a height varying from 4000 to 6500 feet; it sometimes occurs as high as 7000 (Stilfserjoch), but it is then dwarf; it has, on the other hand, been found as low as 1000 feet (Tolmezzo). It is found on the Euganean hills (Rua, 1200 feet),

* Webb has marked it with a ? as growing near Cadiz.

but nowhere on the whole chain of the Apennines. This tree is also very common in Scandinavia, especially to the east of the mountains, where it is found as far as 67° of latitude in the Sarmatian and German plains, and also on the mountains surrounding the Alps to the north and to the east, from the Vosges to the Carpathians. According to Bentham, it occurs on the Pyrenees; but it does not grow even on the mountains in the countries surrounding the Mediterranean. The tree found in the north of Asia, which is somewhat analogous to Abies excelsa, is, according to Ledebour and Link, a different species (*Picea obovata*).

2. Abies pectinata. *D. C.*

The Silver Fir is found over all the Alps from east to west (Baldo, Dorso d'Abramo, Val Bregaglia, Splügen, and in the Alps of Piedmont [Allioni]). It is principally found at a height of from 2000 to 4000 feet, but it occurs as low as 1000 and as high as 4500 feet. Like the last species, it is found on the Euganeans (Rua).

It grows on the whole chain of the Apennines from north to south (Monte Scavone [Flor. Tic. ii. 195], Cimone, Alpi Apuane, Falterona, Camaldoli, La Vernia, Montaniata [Savi, Alb. di Tosc. i. 156]; Lionessa, Monte di Ascoli, Gransasso, Monte Vergine [Tenore, Sylloge, 477]; Monte Pollino, La Sila [Tenore, Géogr. Phys., 76], Aspromonte). The height at which this tree is found varies in the north of this chain from 1000 to 4200 feet, and in the south from 2000 to 5500 feet (Monte Pollino). From a communication made by Tineo, it is also found on the Madonia in Sicily.

The Silver Fir occurs on the northern slope of the Alps, and on the mountains of the middle of Europe; but it is not found in the Sarmatian plains nor on the mountains of the north of Europe. Its northern limit appears to be 57° lat.; it is only planted in the Harz. It is found on the Pyrenees (Bentham), but most probably on no other mountains of Spain. This tree is common on the high mountains of Greece (Sibthorp), and occupies a whole region, according to Chaubard, on Taygetus. The Silver Fir of the north of Asia is another species, Abies sibirica (Ledebour), as is perhaps the Caucasian species.

III.—LARIX.

1. Larix europæa. *Nouveau Duhamel.*

The Larch is spread over, and forms forests in, the upper regions of the Alps from east to west (Tagliamento, Piave, Baldo, Dorso d'Abramo, Stilfserjoch, Legnone, Val Bregaglia, Maloggia, Splügen, Simplon, Mont-Cenis, Col de Tende). Its proper

region is at a height of from 3000 to 6500 feet; it sometimes occurs as high as 7000 feet, but it is then dwarf, and occasionally as low as 2000 or even 1500 feet (near La Piave). It is not found anywhere on the Apennines.

It is less common on the northern than on the southern slope of the Alps. It is found in the Carpathian mountains and in the Sarmatian plains; but it does not exist in the German plain, nor in the mountains of Scandinavia, nor in the Pyrenees; it is equally wanting in Greece and in the Iberian peninsula. The Siberian larch is, according to Ledebour, another species (Larix sibirica).

IV.—CUPRESSUS.

1. Cupressus sempervirens. *Linn.*

The Cypress is found in gardens, or cemeteries, or avenues throughout the whole of Italy, from the foot of the Alps to Calabria, as well as in Sicily; it is here and there found wild. The upper mean height at which it grows is about 2000 or 2500 feet.

It is very common in the other countries surrounding the Mediterranean, Greece, Barbary, Africa, &c. It is supposed to be really wild in the Grecian Archipelago and in Asia Minor.

V.—JUNIPERUS.

1. Juniperus communis. *Linn.*

This species occurs very generally on the Alps from east to west, from the foot to a height of 5000 feet, where it is replaced by the following species, which is very closely allied to it (Karsh, Tagliamento, Baldo, Legnone, Bregaglia, Splügen, Mont-Cenis). It is also very common in the plain of the Po (Pianura del Cavallino and the Euganeans), on the Apennines, at about the same height as on the Alps (La Becchetta, Borghetto, Pontemoli, Cimone, Pianoro, Pietramala, Alpi Apuane, Prato, Monte Pisano, La Vernia, Montamiata, Terni, Spoleto, Rieti, Lugnano, Aquasanta, Ascoli), on the hills and plains near the coast to the 40th degree of latitude (Genoa, Viareggio, Marchia di Pisa, Monte Limone, Montenero, Ostia, Monte Mario); it is seldom to be met with more to the south, at least in the plains. It grows in a dry sandy soil, on heaths and in woods.

It occurs in the whole of the north of Europe as far as Lapland. It is also found in the Pyrenees, according to Bentham, in Spain and in Greece, but, as it seems, only on the mountains, and, lastly, on the Caucasus. According to Pursh and Hooker, it is also found in Canada, in Newfoundland, near Lake Huron, and on the western coast of North America as far as Sitcha;

according to Captain Webb, even to Nepal and Bootan; but this last assertion requires to be confirmed.

2. Juniperus nana. *Linn.*

This species is found on the Alps, in the sub-Alpine and Alpine regions, seldom below 5000 or above 7500 feet (Baldo, Stilfserjoch, Legnone, Maloggia, Alpe di Lago, Simplon, Mont-Cenis, Col de Tende), on the Apuan Apennines, according to specimens communicated by the younger Bertoloni, on Mount Velino, and perhaps also on the other summits of the Apennines, which are sufficiently high.

To the north of the Alps it occurs in the Carpathian mountains (Wahlenberg), in Lapland as far as the most northern regions (Wahlenberg), on the Altaï mountains (Ledebour), in Greenland (F. Vahl), and the most northern countries of North America (Hooker). According to Webb, it is also met with on the high mountains of Portugal.

3. Juniperus hemisphærica. *Presl.*

In the upper, barren region of Mount Etna there is found a low, spreading species of juniper, which, from its locality, I regard as the J. hemisphærica of Presl., although I have never found it in fructification. Its region, according to my own observations, agrees with that assigned to it by Philippi and Carlo Gêmellaro, and may be fixed between 5000 and 7000 feet. Tenore says that it was found by Gussone on the Aspromonte, and on several of the mountains of Calabria.

I found on the subalpine regions of Mounts Sibilla, Amaro, and Gransasso, a juniper bush very much like that from Etna, having flattened berries. I am not quite certain, however, that it is not a mountain variety of Juniperus communis.

Juniperus hemisphærica has not hitherto been met with out of Italy.

4. Juniperus Oxycedrus.

This species is quite different from J. macrocarpa, with which it is often confounded. I found it on the Apennines,, at a height of from 1000 to 3000 feet (between Otricoli and Narni, between Norcia and Castelluccio, on Mount Gargano). According to Tenore, it also grows on Mount Salviano. It is most probably the same plant found by Orlandini at Gabbredo di Monte Auto e dei Monti-Rognosi.

As this species is often confounded with the next, it is difficult to state what are its real localities out of Italy. I take the "Cade" of the south of France to be J. Oxycedrus, as also the species which according to Sibthorp is common in Greece and the

Archipelago, especially on Mount Helicon and in Dalmatia. It probably exists also in the Spanish peninsula.

5. JUNIPERUS MACROCARPA. *Sibth.*

This species is found on the sandy coasts and rocks of the Mediterranean (Marchia di Pisa, Montenero, Ostia, Lago di Licola, Lago di Patria, Cuma) and the Adriatic (in the Pouilla, Tenore)—and in Sicily, according to specimens communicated by Tineo.

It occurs in Greece (Sibthorp), near Cadiz, in Spain (Webb), and I have seen a specimen of it from Barbary named as Oxycedrus in the herbarium of Desfontaines. This species is probably spread over all the coasts of the Mediterranean.

6. JUNIPERUS SABINA. *Linn.*

The Savin is found in the Alps (Pfunds, the mountains of Lombardy, according to specimens received from Odescalchi) and in the Apennines (Castelluccio, Gransasso, Majella). Some Italian botanists say that it grows on rocks near the sea; but I suspect that they have confounded it with J. phœnicea. Allioni, Pollini, Brocchi, and Tenore say that it is a mountain plant, and my own experience confirms this statement.

According to Bentham, it grows in the Pyrenees; it also occurs in Greece (Sibthorp and Chaubard); and in the Spanish Peninsula, always as a mountain plant (Webb). It is found on the northern and western slope of the Alps, on the Altaï (Ledebour), and on the Caucasus (Meyer). Hooker says it is also found in Canada as far as the Saskatchawan, near Lake Huron, and in the Rocky Mountains.

7. JUNIPERUS PHŒNICEA.* *Nouveau Duhamel.*

Is found on the rocks on the shores of the Mediterranean, from Nice and Oneilli to Calabria, and in Sicily; and also along the Ionian Sea and the Adriatic Gulph, from Tarentum and Gallipoli to Cherso (Nice, according to Allioni; Montenero, Terracina, Castel Fusano, Gargano.) Near Lecce, Taranto, Gallipoli (Tenore and Gussone); at Cherso (Koch). From Castellamare, in Sicily, according to specimens received from Gussone. It is not found beyond the lower heights near the sea.

It is generally spread around the Mediterranean, in Greece, and its Archipelago (Sibthorp, Chaubard), probably also in the Levant, on the table-land of Barca (Visiani), in Barbary (Desfontaines), and on the French coast of the Mediterranean (De Candolle and Loiseleur.)

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* I look upon J. Lycia as synonymous with J. Phœnicea.

VI.—TAXUS.

1. Taxus baccata. *Linn.*

The yew is occasionally found on the Alps (Legnone, Baldo according to Pollini; the mountains of Piedmont—Allioni), and on the Apennines (Cima dei monti, Montamiata—Santi). Subiaco (Sebastiani and Mauri); Monte Acuto (Orsini); Mount Gargano (della Torre and Giordano); Matese (according to Tenore); it is probably not wild in the plains. Its lower limits are 1000 feet on the Alps, and 2000 feet on the Central Apennines; its upper limit reaches the region of the Conifers and that of the Ash in the Apennines.

It is found on the western and northern slopes of the Alps, in the mountains of Central Europe, in Scotland, and in the Scandinavian Peninsula. Its northern limit is 61° in Scandinavia (Gefle, Bergen), and 58° in Scotland. It also occurs in the Pyrenees, in Spain (Ortega), and in Greece, as a mountain plant, as well as on the Caucasus. According to Hooker, it grows near Lake Huron and in other places; by others, however, the species found there is considered distinct (Taxus americana).

From the preceding abstract it appears that ten Conifers (viz. *Pinus sylvestris*, *Pumilio*, *Cembra*; *Abies excelsa*, *pectinata*; *Larix europæa*; *Juniperus communis*, *nana*, *Sabina*; *Taxus baccata*) are found on the Alps, which may therefore, with respect to these plants, be taken to represent all Europe. With regard to the heights at which these species are found, we may class them thus:—

To the Alpine region belong *Juniperus nana* and *Pinus Pumilio*. To the region of the Conifers, *Pinus Cembra*, *Larix europæa*, *Abies excelsa*: the two latter however are found at a less elevation. To the region of the Beech and the Oak belong *Pinus sylvestris*, *Taxus baccata*, *Juniperus communis*, *Abies pectinata* and *Juniperus Sabina*. Here and there they descend to the region of the Chesnut-tree. *Juniperus communis* is even found in the plain of the Po.

The north of Europe possesses only six wild Conifers, of which four are found in Great Britain, viz. *Pinus sylvestris*, *Taxus baccata*, *Juniperus communis* and *nana*; Scandinavia furnishes in addition to these *Abies excelsa*; the sixth, *Larix europæa*, is found in the northern plain of European Russia.

To these six Conifers we must add *Abies pectinata* and *Juniperus Sabina* from the mountains of Central Europe, and *Pinus*

Pumilio and *Cembra* from the Riesengebirge and Carpathian mountains.

We see then that on the Alps are found all the Conifers of northern and Central Europe without any exception. This fact must be of importance with respect to the history of plants, although we cannot prove that all these Conifers have certainly descended from the Alps.

The Alps, it seems, possess more species than the northern parts of Europe. In the region of the Conifers these species play the same part as in Scandinavia, the north of Russia, the northern plain of Europe, and the mountains of Central Europe. The forests of Conifers are composed of a larger number of individuals, and occupy a much greater extent of country than those of the Alps. In the north, all the Conifers, with the single exception of *Juniperus nana*, descend into the plains; the Conifers on the northern slope of the Alps do the same, except the Alpine species *Juniperus nana*, *Pinus Pumilio*, and those which, though belonging to the region of the Conifers, approach the Alpine region, as, for instance, *Larix europæa* and *Pinus Cembra*. On this side they appear not only in the valleys and on the terraces, but at the foot of the mountains; but on the southern slope, *Juniperus communis* is the only Conifer inhabiting the plains of Lombardy.

The Alps and Pyrenees have in common *Pinus sylvestris*, *Abies excelsa*, *pectinata*, *Juniperus communis* and *Sabina*, and *Taxus baccata;* perhaps also, but apparently not, *Pinus Cembra* and *Larix europæa*, which are eastern forms. The Pyrenees do not possess solely any one species, unless *Pinus uncinata* is looked upon as a distinct species.

Among the species of the north of Europe, *Larix europæa* and *Abies excelsa* have their southern limit on the south slope of the Alps. The genus *Larix* stops there also, but the genus *Abies* is preserved by other species. *Pinus sylvestris* has, as a general rule, the same limit, but it may be found more to the south; other species, however, then take its place, so that the genus is preserved. *Taxus baccata*, *Juniperus nana* and *communis*, are found further to the south, the two former being mountain plants and inhabiting a colder climate. Among the Conifers, the northern limit of which is in the mountains of Central Europe, *Abies pectinata* and *Juniperus Sabina* extend also more to the south, but always as mountain plants. *Pinus Cembra* is not found further south. *P. Pumilio*, or a form analogous to it, reappears on the Apennines under similar circumstances as regards climate.

The great plain of the Po possesses no Conifers but *Juniperus communis*, which occurs on the heaths and sandy places,

and the southern forms, *Pinus Pinea* and *Cupressus sempervirens*, which are found here cultivated in gardens. Two forms of *Abies* are found on the Euganean mountains, which rise abruptly from the plain.

With the Apennines commences the Flora of the Mediterranean. If we first confine our attention to the plains, valleys, and hills which are in the evergreen region (*regio sempervirens*), we have three species of Pines, viz. *P. Pinaster*, *Pinea*, and *Halepensis;* three Junipers, viz. *J. phœnicea*, *macrocarpa*, and *communis;* and lastly, *Cupressus sempervirens*, which is not truly wild. Although the number of species is thus the same as that of northern Europe, yet fewer principal forms are met with; and although we find here Pine woods and Juniper thickets, they cannot, as far as their importance is concerned, be compared for a moment with the northern species. Of the three species of Pine, *P. Pinaster* belongs to the southern and central parts of western Europe (west of France, Portugal, Spain). It is not found in Italy further south than 42 N. lat., and probably not to the east of the Apennines. The second species, *P. Pinea*, appears to be really wild in a little zone from east to west of Central Italy; it is very generally cultivated throughout Italy, and in all the countries surrounding the Mediterranean. The third species, *P. halepensis*, is very common on either side of the Apennines, and is one of the plants most generally met with round the Mediterranean. The two Junipers, viz. *J. macrocarpa* and *phœnicea*, are similarly distributed, and are very common: J. communis is found in the plain as far south as 40°.

The region of the woods (*Regio sylvatica*) of the Apennines is principally occupied, in its lower part, by Chesnut-trees and deciduous-leaved Oaks, in its upper part by Beech; some Conifers are also present, especially in the region of the Beech; these Conifers are partly the same as those found on the Alps, viz. *Abies pectinata*, *Taxus baccata*, *Juniperus communis* and *Sabina*, and partly of new forms, viz. *Pinus Laricio* on Etna, in Calabria, and in the Abruzzi, and on some other mountains in the basin of the Mediterranean; *Pinus brutia*, which, according to our present knowledge, is indigenous to Calabria, and *Juniperus Oxycedrus*, which appears to extend from the east to the west of Italy.

There is but a small number of the mountains of the Apennines which enter the sub-Alpine region; but when this is the case as at Majella, we find a species of prostrate Pine analogous to *P. Pumilio*, viz. *P. magellensis*. *Juniperus nana* is found on the northern Apennines, on Mount Velino, and perhaps in other places: lastly, *Juniperus hemisphærica* grows on Mount

Etna, on the mountains of Calabria, and perhaps on the highest points of the Abruzzi.

If we consider Italy south of the Po as a whole without distinct regions, it will contain sixteen more species than are found on the Alps; this might have been expected, since this country possesses the climates of the Mediterranean, central Europe, and the Polar regions, according to the height above the sea. Three forms are, however, missing; the *Larix*, *Cembra*, and *Abies*, properly so called (the Spruce Fir), but no distinct type makes its appearance except Cupressus, which is cultivated.

Greece, and its islands, appear, as regards Conifers, to resemble Italy in every essential point. In the plains we have *Juniperus macrocarpa* and *phœnicea*, *Pinus Pinea* and *halepensis*, *Cupressus sempervirens;* on the mountains, *P. Laricio*, *Abies pectinata*, *Taxus baccata*, *Juniperus communis*, *Oxycedrus*, *Sabina;* but we find peculiar to Greece *Abies cephalonica* and *Apollinis*, Link. Spain also resembles Italy in every important particular. These countries have in common *Pinus Pinaster*, *halepensis*, *Juniperus macrocarpa*, *Cupressus sempervirens*, in the plains; and *Taxus baccata*, *Pinus Laricio*, *Juniperus Sabina*, *communis*, and *nana*, on the mountains. At a height of from 3500 to 6000 feet on the mountains of the south of Spain there is found, according to Boissier, *Abies Pinsapo*, which does not occur in Italy.

The northern coast of Africa, and particularly the Atlas and the table-land of Barca, furnish a part of the Italian forms, viz. *Pinus Pinea*, *halepensis*, *Cupressus sempervirens*, *Juniperus phœnicea*, and *macrocarpa*, and in addition to these quite a new form, *Callitris quadrivalvis*. The Conifers are not found south of the Atlas. In the Canary Islands we have a species of Pine, viz. *P. canariensis*, and two species of Juniper, which are also probably peculiar to these islands. The species in Syria and Asia Minor are the same as those found in Italy, at least those on the northern coast of Africa. On Lebanon the remarkable Cedar appears, which is most allied to the Larch among the northern forms.

According to the authorities given above, North America possesses three Junipers that occur in Europe, viz. *J. communis*, *nana*, *Sabina*. As the two former are found in the extreme north of Europe, this fact confirms the striking similarity that exists between the Polar and sub-Polar regions of the two continents; that *Juniperus Sabina* should be found in North America is more strange, as it does not appear north of central Europe. The North American Yew is considered by some as identical with, and by others as different from, the European species. The richness of North America in Conifers in the form

of Pines, Firs, and Larches is well known; but all the other species, even those found most to the north, are different from those of Europe.

History of the Conifers of Italy.

Pinus Pinea was no doubt as common in the time of the Romans as at present; it was principally cultivated, and was called simply *Pinus*.

1. Pliny says that it is branching at its top, whilst *Pinaster* is so from the middle of its trunk upwards.* Ovid describes this tree as having erect foliage, or a bristling head.†

2. Pliny notices, as a remarkable circumstance, that this tree bears at the same time fruit about to ripen, others which will ripen the next year, and others, again, which will ripen the third year;‡ this is a property possessed by the Pine in question, but not by the other Italian species of the same genus.

3. The same author says it has a very large fruit, and it is in fact that which, among the Italian species, bears the largest cones. He says that the nuts are found in cavities, and are covered with a layer of rust, by which they are enabled to lie softly; he states, moreover, that the seeds are eatable, which is only true of this species and of *Pinus Cembra* of the Alps.§ Apicius also talks of Pine Nuts (*nuclei pinei*); he mentions them as an ingredient in a very complicated dish;‖ it is occasionally employed for culinary purposes at the present time. Pliny mentions a variety with a thin shell,¶ which he calls the nut of Tarentum,—a variety still known and cultivated in the kingdom of Naples; he talks of Pine nuts being preserved with honey (vide note, ante); they are at present kept in their cones.

4. The Pine was then as now cultivated in gardens, and planted near country houses, as we learn from the instructions given by Palladius, Varro, Columella, and Cato as to the time of planting and gathering the Pine nuts.** Virgil calls the Pine

* *Plin. Hist. Nat.* xvi. 17—"Pinaster nihil aliud est quàm Pinus sylvestris, mirâ altitudine, et à medio ramosa, sicut Pinus in vertice."

† *Ovid, Metam.* x. 103—"Succincta comas, hirsutaque vertice Pinus."

‡ *Pliny*, xvi. 44—"In maximâ tamen admiratione Pinus est; habet fructum maturescentem; habet proximo anno ad maturitatem venturum, ac deinde tertio."

§ *Pliny*, xv. 9—"Grandissimus (fructus) pineis nucibus—intus exiles nucleos lacunatis includit toris, vestitos alia ferruginis tunica; mira naturæ cura molliter semina collocandi. In melle decoctos (nucleos) Taurini aquicelos vocant."

‖ *Apicius*, "De Opsoniis et Condimentis," i. 33.

¶ *Pliny*, xv. 9—"Harum genus alterum Tarentinæ, digitis fragili putamine."

** *Palladius*, Novb. vii. 9–12; Feb. xxv. 33; Mart. x. 37. *Varro*, i. 45. *Columella*, v. 10, 14. *Cato*, xxviii. (Scriptores Rei Rùsticæ, ed. Schneideri.)

the most beautiful ornament of gardens; and Horace mentions a Pine that grew near his country house.* According to Varro, Pines served to mark the boundaries of estates.†

5. Lastly, in Pompeii and Herculaneum, we find figures of Pine cones in drawings of fruits and of culinary substances, and also on the arabesques: in the latter town kernels of charred Pines have been discovered.

Thus by the word *Pinus* the Latin writers generally meant the *Pinus Pinea;* but the word is also no doubt employed generically, and applies to several species of Pines. Thus Pliny uses the word in the plural, when speaking of several species;‡ Pinus is often mentioned as furnishing wood for building purposes, and especially for ship building, although the wood of *P. Pinea* is not good for such purposes. Used figuratively this word often signifies a ship.§

Pliny, having spoken of the Stone Pine, goes to the *Pinaster*;‖ he says it is nothing but a wild Pine, remarkable for its great height, for the quantity of resin it yields, and for sending out branches from the middle of its trunk; he adds that it also grows in plains. It might be at first supposed that this is nothing but the *P. Pinaster* of modern botanists; *P. Pinea* and *Pinaster* grow together in Tuscany; the first is called *Pino domestico,* and the last *Pino selvatico;* the latter contains a large quantity of resin, has not the crown of the Stone Pine, and grows as well in the plains as on the low mountains. It is true that it does not reach further south than the 42nd degree of latitude; but Pliny does not say expressly that it is found in the territories of Rome and of Naples; it might besides have formerly extended more to the south; for Santi, in his voyages, mentions a large Pine forest destroyed in the Siennese, that had extended from the Ombrone to Castiglione. Notwithstanding all this, there is a strong argument against the identity of the *Pinaster* of the ancients with that of the moderns; the former was said to be of extraordinary height, whilst the latter is almost as low as *P. Pinea.* For the same reason the *Pinaster* cannot be the common *P. halepensis,* which is still lower than *P. Pinea.* But this great height agrees with the *P. Laricio,* which in Corsica attains the enormous height of 140 or 150 feet, and in Sila, in Calabria, of 120

* *Virgil, Buc.* vii. 65—"Fraxinus in sylvis pulcherrima, Pinus in hortis." *Hor.* iii. 22—"Pinus imminens villæ."

† *Varro,* i. 15.

‡ *Pliny,* xvi. 33—Pinis.

§ *Virgil, Buc.* Ecl. iv. 38.

‖ *Pliny,* xvi. 17—"Pinaster nihil aliud est quàm Pinus sylvestris mirà altitudine, et à medio ramosa"—"Copiosorem dat hæc resinam"—"Gignitur in planis."

to 130 feet; but the statement that the *Pinaster* grew in the plains does not apply so well, for *P. Laricio* is a mountain tree; but Tenore says that it is occasionally found in the plains. By *Pinaster* Pliny probably meant both *P. Pinaster* and *Laricio*, which are not very unlike one another. Pliny's *Pinaster* cannot possibly be *P. sylvestris*, for the latter is found on the Alps only at a certain height above the sea, and rarely perhaps on the northern Apennines: it is not very high.

After noticing the *Pinaster*, Pliny passes on to enumerate the Pines, and says*—Most people think that this tree (*Pinaster*) is the same as that found along the coasts of Italy, formerly called *tibulus*, but the latter is more slender, compact, and without knots; it is used in the construction of Liburnian ships, and has little resin. I cannot help thinking that this must refer to *P. halepensis*, for this tree is found along the coasts of Italy; its trunk is more slender, its bark more united, and when older its branches form a tuft; in this point the tree resembles *P. Pinea* more than do any of the others. *Succincta* is the very word used by Ovid when speaking of *P. Pinea;* but the absence of resin renders the resemblance less complete. However this may be, *P. halepensis* was found in Italy, as is clearly proved by the paintings of this tree on the walls of Pompeii.

After speaking of the two sorts of Fir and of the Larch, Pliny says: "The sixth sort (of Conifers) is the *teda*, properly so called, with a more abundant sap than the others; but still less abundant and more liquid than that of the Spruce Fir, employed as torches and lights in religious ceremonies."† The same author says in another place that it is from the *teda* that pitch is obtained in Europe.‡ Here he seems to me to speak of *Pinus sylvestris;* for it is more especially from this tree that pitch is at present obtained:§ its resin is copious and liquid; its branches are still very generally used as torches in the Alps. Other sorts of Pine, however, also furnish torches; it is for this reason that Pliny says "*teda*, properly speaking," signifies torches in general.

The ancients were accustomed, in order to keep their wines,

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* *Pliny*, xvi. 17—"Easdem arbores alio nomine esse per oram Italiæ, quos tibulos vocant plerique arbitrantur, sed graciles succinctioresque, et enodes, liburnicarum ad usus, pœnè sine resinâ."

† *Pliny*, xvi. 19—"Sextum genus est teda propria dicta, abundantior succo quàm reliqua, parciore liquidioreque quàm in piceâ flammis ac lumini sacrorum etiam grata."

‡ *Ibid.* xvi. 21—"Pix liquida in Europâ è tedâ coquitur navalibus muniendis multosque alios ad usus."

§ At the same place Pliny talks of pitch obtained from trees in Syria, and employed for embalming in Egypt; this must be another species.

to add resin to, or to hang Pine cones in them, as is done to the present day: they probably employed several sorts of cones as we do. In this custom we see, perhaps, the origin of the cone that the ancients placed at the end of the Thyrsus; this cone, from its round form, seems to belong to *Pinus Pinea.* From the same custom, no doubt, is derived the habit in Italy of placing a cone as a sign before houses where they sell wine.

Ovid makes Ceres light branches of Pine in the fire of Etna when she was looking for her daughter Proserpine.* Etna was then supposed to have Pine forests, and consequently the Corsican Pine is here referred to.

Firs are distinguished by Pliny, and other Roman writers, into two sorts, *Abies* and *Picea;* two sorts are also found in Italy at the present day, viz. the Spruce Fir, which only occurs on the Alps, and the Silver Fir, properly so called, which is spread over the Alps and the entire chain of the Apennines. Linnæus took *Abies* for the Spruce Fir, *Picea* for the Silver Fir, and fixed on this supposition the botanical names: modern naturalists think that Linnæus confounded the names of these two species, and has occasioned much confusion with respect to their synonyms.

From what Pliny says of the *Picea* liking mountains and slight frosts, and of the *Abies* that it grows on the highest parts of the mountains, as if it fled from the sea,† one might be disposed to think Linnæus right; for, although both are mountain trees, the Spruce Fir grows at a greater elevation than the Silver Fir. Let us first remark that we ought not to keep too close to the difference between *in excelso montium* and *montes et frigora*, in works written when the notions of botanical geography were so vague; there are, moreover, several weighty reasons for translating Abies by Silver, and Picea by Spruce Fir.

1. The Spruce Fir is in Italian Pezzo, and the Silver Fir Abeto. In Greece, too, the Silver has kept its ancient name (ἐλατη), corresponding to Pliny's Abies.

2. Several passages in Pliny lead us to the same conclusion. The seeds of Picea, he says, are small and black.‡ The seeds of the Spruce Fir are smaller than those of the Silver.

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* *Ovid, Fasti,* iv. 493—"Illic ascendit geminas pro lampade Pinus."

† *Pliny,* xvi. 18—"Picea montes amat atque frigora"—"Situs (abietis) in excelso montium, ceu maria fugerat." *Virgil, Buc.* ecl. vii. 66—"Abies in montibus altis." *Georg.* ii. 256—"At sceleratum exquirere frigus difficile est: piceæ tantûm taxique nocentes interdûm, aut hederæ pandunt vestigia nigræ."

‡ *Pliny,* xvi. 19—"Piceæ (habent nucleos) minimos ac nigros: propter quod Græci phthirophoron eum appellant."

3. He says that the cones of *Picea* are smaller and more slender than those of *Abies*.* The cones of the Spruce Fir are not indeed smaller, but they are thinner in proportion to their length. He says that the female *Abies* has no seeds.† This passage, according to Sprengel, refers to the Silver, the scale of which is detached from the rachis, which is not the case in the Spruce Fir.

4. He mentions farther, that the pinnated foliage of the *Abies* is sufficiently thick to stop rain.‡ This is true of the Silver, the leaves of which are disposed in two rows, and thus give the branches a resemblance to the wings of a bird.

5. The *Abies* is, according to him, the largest and roundest of all the Conifers.§ This remark applies better to the Silver than to the Spruce Fir, which is like a pyramid. He says that the wood of the *Abies* is softer and more useful than that of the *Picea*;‖ and, indeed, the Silver is the most easily split, and gives the best boards.

6. Whilst the epithets *nigra* or *nigrans* are given generally to the two species of Fir,¶ Pliny says that the *Abies* is *hilarior*, which no doubt means that it is less dark:** this applies best to the Silver.

7. The *Picea*, according to Pliny, gives a greater quantity of resin, and moreover a sort of white pearl, which looks so like incense, that they cannot be distinguished when mixed together; whilst he says it is a fault if *Abies* gives resin, since its wood is used for building purposes; but he says in another place that the wood of *Picea* is also employed for planks and weaker purposes.†† It is easy to imagine that Pliny, talking of the Spruce Fir which

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* *Pliny, ibid.*—"Piceæ verò totis paniculis minoribus et gracilioribus," &c.

† *Pliny, ibid.*—"Hæc (paniculæ) Abietis masculæ primori parte nucleos habent, non item feminæ."

‡ *Pliny, ibid.*—"Abies folio pinnato densa ut imbres non transmittat," and compare lib. xvi. s. 38, where it is said of the leaves of both the Picea and Abies "insecta pectinum modo," a remark which is only applicable to the Silver Fir.

§ *Pliny, ibid.*—"Abies è cunctis amplissima est—arbore rotundior."

‖ *Pliny, ibid.*—"Materie mollior et utilior."

¶ *Virgil, Æneid*, viii. 599—"Nigrâ Abiete." *Ib.* ix. 87—"Nigranti Piceâ."

** *Pliny*, xvi. 19—"hilarior in totum."

†† *Pliny*, xvi. 18—"Picea plurimam resinam fundit, interveniente candida gemma tam simili thuris, ut mixta visu discerni non quæat"—"Materies (Abietis expetitæ navigiis) præcipua trabibus et plurimis vitæ operibus. Resina ei vitium, unde fructus unus piceæ"—"Materies piceæ ad fissiles scandulas, cupasque et pauca alia secamenta;" and s. 19—"Piceæ perfusa resina." Abies is sometimes used figuratively for a ship, *Virg. Georg.* ii. 68, "Et casus Abies visura marinos." Compare *Æneid* viii. 91.

grows on the Alps, would especially think of resin and of planks when speaking of the Silver inhabiting the Apennines.

8. The same author says that the *Picea repullulat*,* and indeed we may clip the Spruce Fir without injury.

9. The *Abies* has, according to him, a single root. This is the case with the Silver, whose root descends like a post; but it is not so with the Spruce Fir.†

10. Lastly, Vitruvius, speaking of wood for building brought from the Apennines, mentions *Abies*, and not *Picea*.‡

We may then look upon the *Abies* of the Romans as our Silver, and their *Picea* as our Spruce Fir. The first grew, as it does at present, on the Apennines—that is clear; but we might ask whether the latter, though not found there now, did not formerly grow on the same mountains. Pliny calls the *Picea* a sad tree, which is placed as a sign before houses for the dead, and which is used when green for funeral piles.§ From its being so frequently employed, we must suppose that the Spruce Fir grew in the countries to the south of the Alps.‖ Everything is explained when we know that this tree, easily clipped, was introduced into gardens; Pliny expressly says so when he notices the use of this tree in funerals;¶ it is even probable that it was cultivated for this express purpose. In another passage the planted *Picea* is referred to.** Another proof that the Spruce Fir did not grow wild in the Apennines is given us in a passage from Vitruvius cited above, in which no mention is made of anything but *Abies*. Another doubt may arise from Pliny saying that the best pitch for wine-casks comes from Brutium (Calabria), and is obtained from the *Picea*.†† But this argument is sufficiently refuted, I think, by an analogous passage in another author. In one of the chapters of Dionysius of Halicarnassus,‡‡ which the celebrated philologer Mai has discovered, the Conifers found on the Sila mountain in Calabria are noticed, and mention

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* *Pliny*, xvi. 19.

† *Pliny*, xvi. 56—"(Radices) singulares Abieti."

‡ *Vitruv.* ii. 10—"De Abiete supernate et infernate" is clearly on the other and on this side of the Apennines, and not, as Bode suggests, beyond and on this side of the Caspian Sea. Compare *Pliny*, xvi. 76—"Romæ Abies infernas supernati præfertur."

§ *Pliny*, xvi. 18—"Feralis arbor, et funebri indicio ad fores posita ac rogis virens."

‖ Compare *Pliny*, xvi. 14—"Cortex et fagis, tiliæ, abieti, piceæ in magno usu agresti."

¶ *Pliny*, xvi. 18—"Jam tamen et in domos recepta, tonsili facilitate."

** *Pliny*, *ibid.*—"Picea feritatis paulum mitigatæ satu." Compare lib. xv. s. 9—"Picea sativa."

†† *Pliny*, xvi. 25—"Pix in Italiâ ad vasa vino condendo maximè probatur Brutia. Fit è piceæ resinâ." Compare xvi. 22.

‡‡ *Dion. Halicarn.* xx. 15, 16.

is made of the pitch of Brutium obtained from this mountain. Dionysius names three sorts of Conifers: ελάτη, which he says darts upwards towards the sky, πεύκη πιειρα, and πιτυς. If we turn to Brocchi's observations on the Conifers found on the same mountain, we also find three species mentioned, viz. the Silver, or ελάτη; the Laricio, apparently the πεύκη πιειρα, or fat Pine (πεύκη is used for the true Pines generally: Pinea, for example, is called πεύκη); and lastly, *P. brutia*, which will be the πιτυς. The latter also occurs in Theophrastus; it is not quite certain to which species it applies; but, at any rate, it is a Pine and not a Fir, whence it follows that at this period there was probably but one species, viz. the Silver Fir, on the mountains of Calabria.

When speaking of Pine nuts, and of the variety with a brittle shell, Pliny adds that there is a third species, which he calls *nuces sappinæ*. They are obtained from *Picea sativa*, and have, instead of a hard shell, a skin which is so soft that it can be eaten with the kernel.* There must be some error here, for the kernels of the Spruce Fir are not eatable. One might think that Pliny was acquainted with the nuts of *Pinus Cembra*, a tree that grows in the same geographical conditions as the Spruce Fir, and that he supposed the *nuces sappinæ*† to come from this tree; but the nuts of *P. Cembra* are hard like those of *P. Pinea*, and he says that the *nuces sappinæ* come from a cultivated *Pinea*.

Lastly, Pliny mentions a trunk of a Fir remarkable for its size, which he saw on board a ship that brought an obelisk from Egypt, by the order of Caligula.‡

Let us now go to the Larch. I look upon the *Larix* of the Romans as identical with our Larch, although some doubts have arisen on this point. I can, I think, also show that this tree was found nowhere in Italy but on the Alps.

1. This tree is at present called *Larice* on the Italian Alps.
2. Pliny says that its wood is much better than that of the Spruce Fir; that it is incorruptible, nearly indestructible, and remains quite sound under water; that it is redder and stronger-

* *Pliny*, xv. 9—"Tertium (genus) Sappiniæ è Piceâ sativâ, nucleorum cute veriùs quàm putamine, adeò molli ut simul mandetur."

† In another place it is said on the contrary that *Sapinus* is the trunk of *Abies*, barked and plunged in water. *Ib.* xvi. 76—"Abietis quæ pars à terrâ fuit enodis est; hæc qua diximus ratione, fluviata decorticata, atque ita Sapinus vocatur." Compare lib. xvi. 23.

‡ *Pliny*, xvi. 76—"Abies admirationis præcipuæ visa est in navi, quæ ex Egypto Caji principis jussu obeliscum in Vaticano circo statutum quatuorque truncos lapidis ejusdem ad sustinendum eum aduxit."

smelling than that of the Spruce Fir.* He adds that its trunk, like that of the Silver, is very tall,† stouter and longer than that of the Spruce Fir; that its bark is more compact, its leaf more hairy, more unctuous, denser, and more flexible; whilst the leaves of the Spruce Fir are more scattered, drier, thinner, and more glossy.‡ Though this description is not perfectly correct in some of its details, still, taking it altogether, it is pretty clear that the Larch is meant. It is an error on Pliny's part to suppose that the Larch is always green, incombustible, and without cones; an error that is explained, if we admit that formerly, as at present, the Larch only grew on the Alps.§

3. He says that from the Larch there exudes a honey-coloured liquid which never hardens. This is most certainly the Venetian turpentine.||

4. Vitruvius affords us another very important proof, and that is, that formerly, as at the present day, the Larch grew only on the Alps. He says the Larch is only known to the inhabitants of the municipia situated in the neighbourhood of the Po and the coasts of the Adriatic.¶ Then, like Pliny, he falls into the error of supposing the wood of the Larch to be incombustible, and gives as proof the fact, that when Cæsar, in his wars among the Alps, besieged the castle of Larignum, he wished to set fire to a tower; but, to his great surprise, he found that the tower, though surrounded with burning wood, was not hurt. When the besieged afterwards surrendered, and they were asked whence they obtained the wood for their tower, they pointed out the trees to Cæsar, trees which were there in great abundance, and had given the name to their stronghold. They send, says he, this wood along the Po to Ravenna, Ancona, and other municipal towns in these countries. Finally, he remarks that, if this wood

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* *Pliny*, xvi. 19—"Materies præstantior longè (picea), incorrupta vis, mori contumax: rubeus præterea et odore acrior." *Ib.* xvi. 78—"Cariem vetustatemque tardissimè sentiunt Larix, Robur," &c. *Ib.* s. 79—"Larix in humore præcipua."

† *Pliny*, xvi. 76—"Hæ (Larix et Abies) omnium arborum altissimæ ac rectissimæ."

‡ *Pliny*, xvi. 19—"Sed Picea minùs alta quàm Larix, illa crassior, leviorque cortice, folio villosior, pinguior et densior, molliorque flexu. At piceæ rariora siccioraque folia et tenuiora ac magis algentia."

§ *Pliny*, *ibid.*—"Omnia ea (coniferæ) perpetuò virent—s. 33. Sylvestrium generis folia non deciduunt—larici." *Ib.* 19—"Larix nec ardet nec carbonem facit, nec alio modo ignis vi consumitur quàm lapides." *Ib.*—"E ramis generum horum paniculorum modo nucamenta squamatim compacta dependent, præterquàm larici."

|| *Pliny*, xvi. 19—"Plusculum huic erumpit liquoris, melleo colore, atque lentiore nunquam durescentis."

¶ *Vitruv.* ii. 9—"Larix verò qui non est notus nisi his municipalibus qui sunt circa ripam fluminis Padi et littora maris Adriatici."

could be brought to Rome, it would be very advantageous, because they might use it against fire by placing it under the eaves of the roofs. He also mentions a honey-coloured juice obtained from it, which he says is used against Ethisie. The mistake with respect to the incombustibility of the Larch is easily explained; for when its wood has been long exposed to air, and especially to frost and snow, it burns with difficulty.

5. Pliny's remark that the Larch grows in the same places as the Spruce Fir* confirms what has just been said about the geographical position of this tree; the same conclusion may be arrived at from another passage from the same author. He says, that at Rome, a bridge (*pons naumachiarius*) over a place where sea-fights were represented had been burnt, and that the Emperor Tiberius ordered Larches to be felled in Rhetia, *i. e.* in the Alps, to repair it.† He afterwards‡ notices the greatest tree that had been seen in Rome at his time: it was exhibited as a curiosity by Tiberius on this same bridge: it was kept till the building of Nero's amphitheatre; it was a trunk of a Larch 120 feet long and 2 feet thick.

We have remarked above that the localities in which the *Cypress* is found in Italy show that it is exotic. Pliny says that it was a foreign tree, brought from Crete, and difficult to cultivate;§ he thinks that the reason Cato calls it Tarentine is that it was first brought to Tarentum.‖

According to a remark of Pliny's, borrowed from Theophrastus,¶ the pyramidal variety of the Cypress grows in Crete, on the top of Mount Ida and the White Mountains, which are covered with eternal snow; a circumstance that surprises Pliny, since elsewhere it only prospers in warm countries.** Theophrastus, however, merely says that *it is said* to grow on the

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* *Pliny*, xvi. 19—"Situs idem (ac piceæ)."

† *Pliny*, xvi. 74—"Sic certè Tiberius Cæsar concremato ponte naumachiario larices ad restituendum cædi in Rhætiâ præfinivit."

‡ *Pliny*, xvi. 76—"Amplissima arborum ad hoc ævi existimatur Romæ visa, quam propter miraculum Ti. Cæsar in eodem ponte naumachiario exposuerat advectam cum reliquâ materie: duravit ad Neronis principis amphitheatrum. Fuit autem trabs è larice, longâ pedes 120, bipedali crassitudine æqualis."

§ *Pliny*, xvi. 60—"Cupressus advena et difficillime nascentium fuit—huic patria insulâ Cretâ."

‖ *Pliny, ibid.*—"Quum Cato Tarentinam eam appellat: credo quòd primùm eò venerit."

¶ *Theophrast. Hist. Plant.* iv. 1.

** *Pliny*, xvi. 60—"Illa (Cupressus femina: pyramidalis) verò etiam non appellato solo, ac sponte, maximeque in Idæis montibus et quos albos vocant, summisque jugis, unde nives nunquam absunt, plurima, quod miremur; alibi non nisi in tempore proveniens."

snowy tops of the mountains, and the position in the middle regions of the mountains has probably been confounded with the position on the tops. Near Somma, in Lombardy, there is a Cypress, which Napoleon respected when he constructed the Simplon. It is 121 feet high and 23 feet in circumference at 1 foot above the ground. This diameter, when the very slow rate of growth of such trees is remembered, proves it to be very old. According to an ancient tradition, it was planted in the year that Jesus Christ was born; but the Abbé Belèse says that according to an ancient chronicle this tree existed in the time of Julius Cæsar, *i. e.* half a century B. C.* Pliny mentions a Cypress at Rome that was thought to be as old as the city itself, and which fell in the reign of Nero.† At any rate, it is certain that the cultivation of the Cypress was known in very early times. Cato and Varro say that it was planted in gardens to mark their limits.‡ Varro and Columella§ recommend its wood as well fitted for stakes for vineyards. Pliny gives rather an unfavourable account of this tree:‖ its growth is slow, its fruits are useless, its berries ugly, its leaves bitter, with a strong smell, its shadow is not agreeable, it has but little wood (or its wood is light and porous), it is nearly a bush. He distinguishes two varieties, the pyramidal and that with horizontal branches: forms which he wrongly supposes to indicate the male and female plant.¶ He remarks, moreover, that it may be pruned, that it is used for making thick hedges, and that by clipping it representations of the chase, of ships, and other objects may be given to it.**

The *Juniper* of the ancients is the same as that of the moderns: there is no doubt of this. The Italian word Ginepro indicates it. Pliny says that it has spines instead of leaves, that it keeps its fruit all the year round, and sometimes those of the pre-

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* *Loudon, Arboretum*, iv. 2470. The Milanese chronicler might not, however, have been very correctly informed.

† *Pliny*, xvi. 86—" Fuit cum eâ (Lotus in vulcanali quod Romulus constituit, æquæva urbi) cupressus æqualis, circa suprema Neronis principis prolapsa atque neglecta."

‡ *Cato*, 28, 151. *Varro*, i. 15.

§ *Varro*, i. 26. *Columella*, iv. 26.

‖ *Pliny*, xvi. 60—" Natu morosa, fructu supervacua, baccis torva, folio amara, odore violenta, ac ne umbra quidem gratiosa, materie rara, ut pœne fruticosi generis."

¶ *Pliny*—" Duo genera earum; meta in fastigium convoluta quæ et femina appellatur. Mas spargit extra se ramos."

** *Pliny, ibid.*—" Nunc vero tonsilis facto in densitate parietum coercitaque gracilitate perpetuò tenera. Trahitur etiam in picturas operis tapiarii, venatus, classesve, et imagines rerum tenuifolio, brevique et virenti semper vestiens."

ceding year. He says that the Juniper has no flowers, and adds that some, by a mistake, suppose that there are two sorts: one with flowers and the other with fruits;* this assertion refers perhaps to the two sexes, which in this plant are on different individuals.

By *Oxycedrus* the Greek and Roman writers meant the present *Juniperus Oxycedrus*, and probably *macrocarpa*, which they no doubt distinguished as little as do most botanists of the present day. Pliny mentions it when speaking of *J. phœnicea*, and says that it resembles the Juniper by its sharp prickly leaves; this is, indeed, the distinguishing mark between the *Oxycedrus* and *phœnicea*. His statement that it is branching and knotty, and that its fruit is as large as that of the myrtle, agrees very well with our *oxycedrus* and *macrocarpa*. On the other hand, it cannot be said that its fruit is sweet. When, besides, he supposes that it only grows in Phœnicia, his error probably arises from his following the Greek authors.†

Juniperus phœnicea was also known to the ancients; it was the *Cedrus*, *Citrus*, and *Citrea* of the Romans. It is placed in the same rank as the *Juniperus* and *Oxycedrus* by Pliny and Vitruvius; but they add that its leaves are like those of the Cypress. This resemblance is, indeed, the most striking distinction,‡ and their observation evidently proves that neither the Cedar of Lebanon, which the ancients also called *Cedrus*, nor the Citron-tree, which they called *Citrus*, can here be meant. When Pliny talks of the great Cedar (*Cedrus major*), it is not quite clear whether he means the Cedar of Lebanon or *Juniperus phœnicea*. The last supposition is supported by the fact that, according to the description, the sexes are on different plants; and the first, by the remark relating to the lasting character of the wood and its utility for making statues of the gods. Its seed is said to resemble that of the cypress. This agrees with *Juniperus phœnicea* better than with the Cedar, if we suppose Pliny observed accurately the difference between the seeds and berries. The seeds of the Cedar are much larger and have a large per-

* *Pliny*, xvi. 38—"Junipero spina pro folio est." *Ib.* 44—"Juniperus annifera habetur; novusque fructus cum annotino pendet." *Ib.* 40—"Nec Juniperi florent (at another place he says the same of the *Picea*, *Larix*, and *Pinus*). Quidem earum duo genera tradunt, alteram florere nec ferre, quæ verò non floreat ferre protinus baccis nascentibus, quæ biennio hæreant. Sed id falsum omnibusque iis dura facies semper."

† *Pliny*, xiii. 11—"Juniperi similem habent Phœnices et cedrum minorem. Duo ejus genera Lycia et Phœnicia, differunt folio: nam quæ durum, acutum, spinosum habet, oxycedros vocatur, ramosa et nodis infesta: altera odore præstat. Fructum ferunt myrti magnitudine, dulcem sapore."

‡ *Pliny*, xvi. 44—"Citreæ et Juniperus omniferæ habentur."—*Vitruv.* ii. 9—"Arboris ejus (Cedri) sunt similes cupresseæ foliaturæ."

sistent wing. Pliny probably confounded these plants the one with the other.* The ancient botanists, like the common people of the present time, called its wood Cedar. Pliny says that many trees of *Citrus* are found in the country of the Moors, near the Atlas, and that this wood is imported by the wealthy for making tables ;† it may be asked whether this refers to *Juniperus phœnicea*, which grows in North Africa to a much greater height than in Italy, or to *Callitris quadrivalvis*, which, according to Desfontaines, grows on the Atlas and on the uncultivated hills of Barbary; or lastly to the Cedar of Lebanon, which, according to some recent observations, is also found on the Atlas.

The *Sabina* of the ancients ought also to be regarded as our *Juniperus Sabina*. The ancients place it among the evergreens; and when it is said that there are two sorts, one with the leaves of the Tamarisk, and the other with those of the Cypress, the two sorts of leaves of this shrub have probably been remembered: the leaves of the one sort are short, closely packed, arranged in four series, and resemble those of the Cypress; while those of the other are long, drawn out, and look like the leaves of the Tamarisk.‡

The *Taxus* of the ancients is no doubt the same as the present one. Pliny mentions it at the end of his enumeration of the Conifers, and says that it resembles them; that it is the only one with berries; that it is dark, graceful, sad-looking, and without resin.§ In another passage, he says expressly that it is an evergreen.|| The dark colour of this tree and its thick shade, mentioned also by Lucanus,¶ led the ancients to look upon it as

* *Pliny*, xiii. 11—"Et majoris cedri duo genera: quæ floret, fructum non fert; frugifera non floret; et in eâ antecedentem fructum occupat novus. Semen ejus cupresso simile. Materie vero ipsi æternitas; itaque et simulacra deorum ex eâ factitaverunt."

† *Pliny*, xiii. 29—"Atlas mons peculiari proditur silva de quâ diximus. Confines ei Mauri, quibus plurima arbor citri et mensarum insania, quas feminæ viris contra margaritas regerunt."

‡ *Pliny*, xvi. 33—"Folia non decidunt—Sabinæ." *Ib.* xxiv. 61—"Herba Sabinæ, brathy appellata à Græcis, duorum generum est; altera tamarici similis folio, altera cupresso; quare quidem Creticam cupressum dixerunt." —Pliny is incorrect when he calls the *Sabina* a herb; it is a shrub.

§ *Pliny*, xvi. 20—"Similis his etiamnum aspectu est, nequid prætereatur, taxus, minime virens, gracilisque et tristis, ac dira, nullo succo, ex omnibus sola baccifera."

|| *Pliny*, xvi. 33—"Folia non decidunt abieti, &c.—taxo." Lib. xvi. 78 —"Cariem vetustatemque non sentiunt Cupressus, cedrus, taxus."

¶ *Lucani*, *Pharsalia*, ed. Weber, vi. 645—"Phœbo non pervia taxus opacat."

consecrated to the infernal regions. Silius Italicus,* in his description of the lower world, places a large Yew-tree there; and Claudian describes the Furies as carrying yew-torches.† It was generally believed in ancient times that the yew was poisonous. Pliny‡ says that the male tree is noxious, that its berries, especially in Spain, are poisonous; and even that wine kept in casks, made of this wood in Gaul, can cause death; and that in Arcadia the poison is so strong, that any one who eats or sleeps under the shadow of this tree is killed. Columella calls yew-trees *Taxos nocentes*;§ Claudian *pestiferas*;‖ both Virgil and Columella say that bees shun it.¶ The frequent mention of the Yew by the ancients leads us to suppose that in their time, as well as in our own, it grew both on the Apennines and on the Alps. The art of clipping trees and of giving them all sorts of shapes to ornament gardens (opus topiarium) was, as we have already stated, known to the Romans; although this was done with the Cypress, the Silver Fir, and the Box, it was not practised on the Yew, probably because the latter tree required a colder climate than the plains afforded.

There is no reason for supposing that the species of Conifers indigenous in Italy at the present time differ from those of former ages. The most common and the most easily distinguished are expressly mentioned by the ancient authors, and are, for the most part, described with sufficient accuracy to enable us to determine what they really were. Those that are not mentioned may, from the vague ideas of those times, be considered as having been united to the others, or as having altogether escaped observation.

Although Italy contains 20 species of Conifers (excluding the Cypress), and Europe north of the Alps has but 6, the number of individual trees is by no means apportioned in the same way. The Conifers in the north of Europe form immense forests, and consequently play an important part in the physiognomy of nature. In Italy, on the contrary, with the exception of the Alps, where they form by their quantity a region at the mean height, these trees constitute but small scattered woods, which

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* *Silius Italicus*, ed. Ruperti, xiii. 595, 596.

† *Claudian*, *Rapt. Pros.* edit. Gesneri, 3, 386.

‡ *Pliny*, xvi. 20—"Mas noxio fructu. Letale quippe baccis, in Hispaniâ præcipuè venenum inest. Vasa etiam viatoria ex eâ vinis in Galliâ facta, mortifera fuisse compertum est et esse in Arcadiâ tam præsentis veneni, ut qui obdormiant sub eâ, cibumque capiant moriantur."

§ *Columella*, ix. 4, 3.

‖ *Rapt. Pros.* 3, 386.

¶ *Columella*, l. c. *Virgil*, Ecl. ix. 30.

give no important feature to the face of the country. Along the coast of the Gulf of Genoa, and as far as the Roman States, some forests of Pines peculiar to the basin of the Mediterranean are certainly found: *Pinus Pinea*, *Pinaster*, and *halepensis;* the coppices near the coast contain Junipers of the south of Europe; forests of Spruce exist in some countries of the central Apennines: for example, near Vallombrosa and Camaldoli, and generally in the upper part of Tuscany. Forests of Conifers are also met with in the Abruzzi, and on Mount Sila, in Calabria, where the Silver Fir or the Calabrian or the Corsican Pine predominate. On Etna, lastly, forests of the Corsican Pine exist; but the whole is not to be compared with the immense tracts covered by these trees in the north of Europe.

It appears, then, that Italy is not very largely stocked with Conifers, and they consequently play a subordinate part in the operations of life. In the Alps exclusively do we find these trees the objects of the same industry as in the north; here they are cut down, slided over the sides of the mountains, floated down the rivers, divided in saw-mills, and sent away as trunks, beams, and planks: this work, too, is only found going on here and there, and on a comparatively small scale.

In Scandinavia and northern Russia the houses are constructed almost entirely of the wood of Conifers; in central Europe this wood is also largely used for beams, floors, and staircases; in Italy, with the exception of the Alps, the houses with the staircases and floors are built of nothing but stone or brick. In the north, Conifers are used for palisades, bridges, and roads; in the centre of Europe, they are greatly employed for bridges, partitions, and garden palisades; but in Italy the bridges are of stone, and high walls surround the gardens. The wooden pipes for water and the piles of the north are replaced in Italy by stone aqueducts and piers. As Italy, with the exception of the Alps, has but few mines, she does not, like the north, employ large quantities of Fir-wood. Ship-building and navigation have not the importance that they have in the north. Genoa obtains planks for her ships from the western Alps and from Corsica; Venice and Trieste theirs from the eastern Alps; Naples has hers from Sila; Italy, however, imports pitch, tar, and other resinous products from foreign countries; but Venice is the principal place of exportation of one of these products, Venice turpentine, which is obtained from the Larch on the high regions of the Alps. On the south slope of the Alps turpentine is also obtained from the two species of Fir; it is collected by the Italian peasants, who ascend the mountains and climb up the trees to make incisions in them.

The Cypress and Scotch Fir are much more important in the

Italian gardens than Conifers in those of the north of Europe, if the English gardens are excepted, where, from the mildness of the winter, the beautiful Cedar is able to flourish, and where such a high value is placed on pineta composed of Conifers from all countries.

Many traditions exist which intimate that Italy, and especially the Apennines, were more wooded and consequently richer in Conifers than at the present day; but as I shall speak elsewhere of this subject, I shall confine myself to the following observations. At Rome, according to Cornelius Nepos, the houses were covered with wood, till the war broke out with Pyrrhus,* consequently for nearly five centuries; according to Dionysius of Halicarnassus, the boards prepared at Sila were sufficient for the whole of Italy, were used for building houses and ships, and the Romans obtained a considerable income by establishing the preparation of the pitch of Brutium.†

During the middle ages the Yew was very much destroyed in consequence of the great commerce made by the Venetians of its wood; for, before the discovery of powder, the Yew was in high esteem for making bows.‡ In former times the Yew was much more common to the north of the Alps than at present, as we may see from what Cæsar says on this subject with respect to Germany and Gaul.§

XXI.—*Contributions to a History of the Relation between Climate and Vegetation in various parts of the Globe.*

No. 5.—*The Vegetation of the Province of Ceará, in Brazil.* By George Gardner, F.L.S., Director of the Royal Botanic Gardens, Ceylon.

From Pernambuco I went by sea to Aracaty, a small town in the province of Ceará, about three degrees and a half to the north of Pernambuco, with the intention of making an inland journey from thence to the Rio Tocantin, and by it descend to the Amazons. The country around Aracatý is still flatter than it is at Pernambuco, and consequently does not afford much that is interesting to the botanist. With the exception of one small hill

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* *Pliny*, xvi. 15—"Scandula contectam fuisse Romam ad Pyrrhi usque bellum annis 470, Cornelius Nepos autor est."

† *Dion. Halicarn.* xx. 15, 16.

‡ For this reason the exportation of yew-wood was prohibited in Scotland.

§ *Cæsar, de Bello Gall.* vi. 31—"Cativolus taxo, cujus magna in Galliâ Germaniâque copia est, se examinavit."

to the south-west, and a few sand-hills towards the sea, it is one continued sandy plain, covered with *Carnahuba* Palms (*Corypha cerifera*, Mart.), but nothing else worthy the name of a tree. This palm is one of the most elegant of its size I have met with. Its stem, which is quite straight, rises to a height of about forty feet, while its fan-shaped leaves are so arranged as to form a sort of round ball at the summit. It exists in vast quantities, the first part of the road from Aracatý to Icó, a town about 200 miles inland, passing through a dense forest of it, more than 20 leagues in length, its foliage sheltering a great multitude of parrots, parrokeets, pigeons, woodpeckers, and hosts of other small birds. At this place I was obliged to remain for about a fortnight to make arrangements for my journey, and during that time I made a few short excursions, but did not meet with much to reward me. A few species of *Cassia*, *Jussieua*, *Herpestis*, a *Zizyphus*, a few *Mimosæ*, a *Patagonula*, two or three species of *Turnera*, *Angelonia arguta*, Benth., and a few other plants, were all I met with. The rainy season was just over, and the vegetation was already much burned up by the drought. I reached the town of Icó in eight days. For the first two-thirds of the way the country is level; but the rest is undulating, and sometimes rocky, from being traversed by several small serras. In this latter part much of it consists of large open tracts, called *Vargems*, which in the dry season are nearly destitute of vegetation, forming true deserts, while others are covered with *Catinga* forests, similar to those which exist on the banks of the Rio de San Francisco, nearly all the trees in which, when I passed through them, were destitute of leaves. On this journey I collected the following plants:—Two new species of *Angelonia*, *A. arguta*, Benth., and *A. biflora*, Benth. The latter is a very handsome species, and is now in cultivation in England, having been raised by Mr. Murray of Glasgow, from seeds sent home by me. It is known among cultivators by the name of *A. grandiflora*. It grew in great masses on the sandy banks of a small river, and, being in full flower, was a most beautiful object. In moist sandy places grew a very fine *Herpestis*, about a foot high, with rose-coloured flowers; and in gravelly places on the open campos a beautiful *Evolvulus*, also about a foot high, very much resembling *Linum usitatissimum* in the arrangement, size, and colour of its flowers: a few small strong-smelling species of *Pectis* grew in similar situations. On the rocky ridges, which consisted of gneiss cropping out nearly vertically, grew a few species of *Opuntia* and *Cereus*, the curious *Pithecoseris pacourinoides*, Mart., and a fine shrubby *Vernonia*. In dry sandy places I found a few small *Composites*, among them a new species of *Stiftnopappus*. The only trees in flower were *Sapindus*

saponaria, *Patagonula* sp. n., growing gregariously, and forming large forests; an evergreen *Zizyphus*, growing solitary in the campos, and giving shade both to the traveller and to the cattle, which graze there in large herds; a fine new species of *Triplaris*, the trees which bear the female flowers being conspicuous at a great distance, from the large pink-coloured calycine segments; *Licania rigida*, Benth., a low wide-spreading tree, also solitary in the open campos, and revered by the traveller for its shade. Most of the shrubs were out of flower, a *Mimosa* or two and a fine *Combretum* being all I met with. In a few small lakes which we passed surrounded by *Carnahuba* Palms, I found a *Limnanthemum* with white flowers, and a large yellow-flowered *Utricularia*.

Icó is a fine town for the inland parts of Brazil; but the country around it was so completely dried up, and so completely a desert, that during several walks I took into the country I did not meet with more than half-a-dozen plants in flower. One of these was, however, a very interesting one, a species of *Lycopodium*, nearly allied to the bell-shaped species brought from the west coast of America, but which opens out when put into water for some time. The species from Icó has not yet been described. It grows in open parts of the *Catinga* forests, and in the dry season is scarcely to be seen, from the fronds being rolled closely over each other, the old withered ones being the outermost; but as soon as a shower of rain falls the absorption of moisture causes them to expand, and the ground is then one sheet of green. The species of Lycopodium which roll themselves up in this manner do not lie on the surface of the ground, to be blown about as the wind listeth, as an Edinburgh botanist in a notice of them has stated, but are so firmly fixed in the soil by their numerous fibrous roots, that it is with no little force they are rooted up. Having been informed at Icó that I should find the country in the neighbourhood of Crato, another town about 100 miles to the south-west, well adapted for my pursuits, as the vegetation there remains verdant all the year round, from its greater elevation, and from the existence of several small streams which flow from a mountain range that exists there—on my journey to that place I passed through a country which differs remarkably from that which lies between Aracatý and Icó, both in its physical appearance and the nature of its vegetation. The former is of a hilly, undulating character, exhibiting none of those large open plains which are met with nearer the coast, but, on the contrary, it is all wooded with small trees and shrubs, nearly the whole of which are deciduous. As it was in the beginning of the dry season when I started from Icó, there was scarcely a leaf to be seen, a circumstance which, to a botanist particularly, makes a

journey in such a country very monotonous and uninteresting. The most abundant tree is that called by the inhabitants *Arveira* (*Schinus Aroeira*, St. Hil.): it flowers before the leaves appear, and in this state much resembles the Alder of Europe when loaded with its catkins. Its mode of growth is upright, and it reaches to a height of from forty to fifty feet. Large *Ingas* and *Mimosas*, and the *Triplaris* and *Licania rigida*, already mentioned, are also common. In passing along, the eye is sometimes relieved from the flowerless monotony of the woods by seeing here and there a solitary pink or yellow arboreous *Bignonia*, or an azure-blossomed *Jacaranda*, destitute of foliage, but rearing their consequently more conspicuous and magnificent diadems of flowers above the other denizens of the woods, or an occasional plant of *Cochlospermum serratifolium*, loaded also with its large and beautifully yellow bloom, attracts the attention of the traveller. On dry hilly places there were abundance of small shrubs; the only ones, however, that I met with in flower were two or three species of *Lippia*, and a *Krameria* similar to that found in the island of *Itamarica*. Within a day's journey of Crato I collected the only Orchideous plant met with from the coast upward, a new *Oncidium*, which I have called *O. urophyllum*. The inhabitants call it *Rabo de Tatú* (armadillo's tail). It grows in great plenty on the under sides of the branches and on the stems of *Geoffroya superba*, H. B. A. K., the back of which is soft, and well adapted for the growth of epiphytes. It was not till I came within a few leagues of Crato that the country became more verdant, and large tracts of land planted with sugar-cane gave the assurance that I was approaching a place better suited to my pursuits than any I had seen since leaving the coast. The town of Crato is small, and situated in the hollow part of a large valley, several leagues in extent, and bounded on the south and west by the Serra de Araripe, an eastern branch of a low mountain range which runs from south to north, and divides the province of Ceará from that of Piauhý. Sugar-cane, mandioca, rice, tobacco, and a little cotton are the principal articles of culture in the vicinity of Crato. From the juice of the cane a kind of impure sugar is prepared, called *Rapadura*, and made into hard cakes about the size of bricks. A kind of rum is also prepared from it, which meets with a very ready sale. Almost all the fruits which are sold in the towns near the coast grow here, such as the orange, lime, lemon, mango, papaw, banana, plantain, grape, pine-apple, melon, water-melon, &c. There are a few small plantations of cocoa-nuts, which appear to thrive and bear abundantly; and in the woods are a great number of Cashew trees, but their fruit, or rather the thickened peduncle, which is the esculent part, is small, not bigger than a cherry. In the *Ca-*

tingas, or deciduous forests, the *Mangaba* (*Hancornia speciosa*) is common, as are also the *Araça* and *Guava*, two species of *Psidium*. Another delicious fruit belonging to this genus is the *Marangaba*. It is the produce of a little shrub about two feet high, which grows in great abundance on the flat top of the Serra de Araripe. It is the *Psidium nanum* of my catalogue, No. 1611. The woods near the town produce a fruit belonging to a new species of *Mouriria* (*M. Pussa*, Gardn.), the berry of which is black, and about the size of a large gooseberry. In appearance and taste it very much resembles the fruit of *Eugenia cauliflora*, D. C. It is called *Pussa* by the Indians, a name I have retained as its specific appellation. The great cause to which the fertility of this part of the province may be attributed exists in the numerous springs which rise from the base of the Serra de Araripe, and which are again divaricated in a thousand directions for the purpose of irrigation. In this place I was obliged to remain about five months, as the country to the westward, to which it was my intention to proceed, is utterly impracticable during the dry season, being then quite a desert, and affording neither grass nor water for horses; but during that time I was actively employed in making excursions, and bringing together a fine herbarium of the plants of the district. The Serra de Araripe being the best field for my researches, it was frequently visited. Many days, at different times, were spent in exploring its ravines, sides, and summit, every trip yielding me large supplies of new and rare plants. The greater proportion of the wooded districts around Crato consists of deciduous trees and shrubs forming *Catinga* forests; but in low moist localities, and along the base of the serra, a great many of the trees and shrubs are evergreen. One of the most common of the denizens of the *Catingas* here is *Magonia glabrata*, St. Hil., and it is one of the few truly gregarious trees I have met with in Brazil, covering large tracts for miles, to the exclusion of almost every other. In general it is a tree from thirty to forty feet high; but old individuals attain often to a much greater height. Like many of the other inhabitants of the *Catingas*, its flowers appear before the leaves. The blossoms are produced in large panicles, are of a yellowish-green colour, and very sweet-scented. The tree is called *Tingi* by the people of the country, who apply it to many useful purposes. An infusion of the bark of the root is employed to poison fish, and that of the stem to cure old ulcers, while an excellent soap is afforded by the large cotyledons of the seeds. Another tree, which grows in similar situations, is a species of *Caryocar*; and makes a fine appearance when covered with its large racemes of yellow flowers. The oily fruit is a great favourite with the inhabitants, and the hard wood is used

in mill-work. Its native name is *Piki*. Two large trees belonging to the *Mimoseæ* are also common in the dry woods. One of these, the *Visgéira* of the inhabitants, is a species of *Parkia* (*P. platycephala*, Benth.), and is a remarkable tree, from its large fern-like leaves and its dark purple flowers, which grow in a large head suspended at the end of a peduncle more than a foot in length. The *Jatobá*, a species of *Hymenaea*, is another large tree; and the Cashew also reaches to a good height, and grows more upright than the variety on the coast. A species of *Andira*, called *Angeline*, and a *Vitex*, are also fine trees of moderate size. There are likewise two large *Bignonias* here, one with rose-coloured, the other with yellow flowers; but, owing to the hardness and durability of their wood, which is much sought for by workers in mill and cart work, they are not allowed to attain any great size near the town. Besides these there are many other trees, but which can scarcely be called large ones. Among them may be mentioned the *Páo de Jangada* (*Apeiba Tibourbou*, Aubl.), conspicuous from its numerous large prickly capsules. Its wood affords the material of the raft-boats so common on the coast, called *Jangadas*. A species of *Byrsonima*, very lovely when in flower, and another of *Callisthene*, also remarkably beautiful, are not uncommon.

There are, of course, many other trees; but, from not being either in leaf or in flower during my stay, it was impossible to determine what they were. On the Serra de Araripe several species exist that do not occur on the plains below. The top of the serra is quite flat, forming what are called in the north of Brazil *Taboleiras*. They are generally grassy, and not very thickly wooded, which gives them an orchard-like appearance. The *Piki*, the *Mangaba*, the *Cashew*, and *Gomphia hexasperma*, St. Hil., are the most common trees of the *Taboleira*; but there are besides a few fine *Leguminosæ*, a beautiful *Vochysia*, *Qualea parviflora*, Mart., an *Albertinia*, and a *Styrax*. Under the shade of these, many fine herbaceous plants and humble shrubs are to be found. Of Palms only four species are found in the neighbourhood of Crato; the *Carnahuba* (*Corypha cerifera*, Mart.), which is so common between Aracatý and Icó, straight up to within two days' journey of this place, but is not found nearer. Two of the species are very fine. The tallest is that to which the inhabitants give the name of *Buriti*, and is the *Mauritia vinifera*, Mart. It grew very sparingly near Crato in swampy places, but I afterwards met with whole forests of it in the more inland provinces. Another, which nearly equals it in height, is a species of *Attalea*. It rivals the Cocoa-nut in the height of its stem, and far excels it in the size of its leaves, which at first grow nearly upright, and then curve

gently outwards, giving the tree a most magnificent appearance. The third species is the *Acrocomia sclerocarpa*, Mart., very striking from its fusiform prickly stem. It is rather strange that this palm, which is also common in the south of Brazil, has there its stem of equal thickness throughout, while everywhere that I have seen it in the north it is very much bellied out in the middle. This variety is common about Pernambuco. It is known at Crato by the name of *Macahuba*. The fourth kind grows in the *Catinga* forests, and is of no great size nor beauty. It is called *Catolê*. *Cacteæ* are very scarce: I only met with four species, all of them similar to kinds I had already found on the banks of the Rio de San Francisco. *Orchideæ* are still more rare. Only two Epiphytes were found—the Oncidium already mentioned, and a Catasetum-like plant found on the stems of the *Catolê;* and two terrestrial species—a *Spiranthes* and a *Habenaria*. Around Crato, and in the *Catinga* forests generally, the Epiphytal *Orchideæ* of south Brazil are represented by *Loranthaceæ*, which, in the shape of different species of *Viscum* and *Loranthus*, but of Viscum in particular, exist on almost every tree, and, being evergreen, give a remarkable appearance to the deciduous forests. *Ferns* also are rare; but the ravines in the Serra de Araripe afforded me a few curious ones. Among these was a solitary tree-fern—a *Cyathea*—the only one I met with so far north.

The longest excursion I made during my residence at Crato was to a small town called Barra do Jardim, about sixteen leagues to the south. The road skirts the base of the Serra de Araripe for about half its length, and then crosses it. The breadth of the *Taboleira* is upwards of thirty miles, and level as a bowling-green; and since water is nowhere to be found on it, travellers have generally to carry as much as will serve during the greater part of the day. I found it covered with a vegetation similar to that I have already described as existing on it near Villa do Crato. On my journey I found nothing new, except a species of *Rollinia*, not unlike the *R. longifolia*, St. Hil., but a very distinct and undescribed species. On my arrival at Barra do Jardim, I found the country still more scorched than about Crato, and my collection consequently received but small additions, though a few of these were very interesting. One of these was a fine arboreous species of *Olax* (*O. Gardneriana*, Benth.), not unlike an orange tree in habit, and bearing abundance of sweet-smelling flowers. A large *Hirtella* and a fine *Laurus* were also found in flower. During my stay at Jardim I made two short excursions: one about five leagues to the east, and another three in a westerly direction; neither, however, productive in a botanical point of view. On my return

from the latter, I collected fine specimens of a curious flat articulated—stemmed, leafless species of *Viscum*, and a species of *Copaifera* (*C. nitida*, Mart.); the latter a noble, large tree, common on the top of the Serra, and affording abundance of *Balsam;* it is called *Páo d' Olho* by the inhabitants. In the *Catinga* forests, on the south side of the Serra de Araripe, I saw for the first time the strange-looking *Chorisia crispiflora*, but, like all the other trees there, it was neither in leaf nor flower. It is a large tree, belonging to the natural order *Bombaceæ*, from thirty to fifty feet high, with a wide-spreading top of branches. The stem bulges out towards the middle, till it becomes about four times as thick as either the top or bottom parts, and from this circumstance is called by the inhabitants *Barriguda*. My visit to Jardim was made as much to ascertain the geological structure of the country, as to make botanical collections. During my excursions in the neighbourhood of Crato I ascertained that the whole of the rocks there belonged to the chalk formation, the Serra exhibiting the whole series, from the ferruginous sandstone up to the pure white chalk itself, which, like that of England, contains flints. As I have elsewhere published a dissertation on this subject, I shall say little more here than that this was the first time the chalk formation was found to exist on the great continent of America; and that while I was at Jardim I made a fine collection of fossil fishes from the rocks belonging to this formation, as well as a few shells. These fishes were all new to science, and what is remarkable, though to be expected, belonging to forms equivalent to those which are found in the fossil state in the chalk rocks of England. On my return to Crato I again made a few excursions in that neighbourhood, and thus added considerably to my Herbarium. One of the finest plants met with at this time was a most beautiful new species of *Allamanda* (*A. violacea*, Gardn.), a shrub from four to six feet high, bearing numerous large flowers not unlike those of *Gloxinia speciosa* in colour. This is by far the most beautiful species belonging to the genus, all of which, with this exception, bear yellow flowers. I unfortunately did not meet with it in seed.

It was not till about the middle of February, 1839, that I was enabled to leave Crato. It had rained there for about a fortnight, and as the herbaceous vegetation springs up with astonishing rapidity as soon as the rains set in, I was assured that now there would be no lack either of grass or water for my horses. Just before leaving Crato I was so fortunate as to be able to engage a young Englishman, who had travelled a good deal in the interior, to accompany me as an assistant. My object now was to gain the city of Oeiras, the capital of the province of Piauhý,

and distant from Crato in a westerly direction nearly 500 miles. The greater part of the journey lay through a country which in the dry season becomes quite a desert, but which in the rainy season is verdant enough, the Catinga forests being then covered both with leaves and flowers, and the annual grasses, and the perennial herbaceous plants, which during the drought were apparently destroyed, covering the soil with a green carpet. At about two leagues to the west of Crato we entered upon the great Serra of which the Serra de Araripe is a branch. This is called by the native Indians *Ibiapaba*, and by the Brazilians Serra Vermelha. On the top it is perfectly level, and between thirty and forty miles in breadth. The first half of it is very similar to the Serra de Araripe, that is, thinly covered with trees of moderate size, with an abundance of low shrubs and herbaceous plants; but the west half is very thickly wooded with small trees, large tracts of which are every season burned to allow of a more abundant supply of herbage for the cattle and horses which are sent to pasture on it during the dry season. The Serra does not reach the level country to the westward till about twenty leagues from the western boundary of the *Taboleira*, gradually decreasing by long undulating or flat sandy tracts. The last of these is a little beyond a place called Varze da Vaca. The low thin forests which cover these tracts are *Catingas;* but in the flat tracts the trees are fewer, and during the rainy season afford abundance of herbage, on which large herds of cattle feed. Although the general vegetation was somewhat similar to that around Crato, I found much that was new to me. Among the trees I may mention a large one called *Cedra* by the inhabitants, the wood of which is in much request for household purposes. It smells strongly of the common cedar, but belongs to the natural order *Meliaceæ*. Another, which I did not meet with in flower, is called *Bráuna*, and the wood, which is very hard, is much used in mill-work. It belongs to the natural order *Leguminosæ*. A *Spondias* (*S. tuberosa*, Arrud.) is also common, and produces a fruit which is very much esteemed. There were also some fine large *Mimoseæ*. Some of the flowering shrubs were very fine, the violaceous *Allamanda* being not the least common. The others were species of *Coutarea*, *Helicteres*, *Cordia*, *Cæsalpinia*, a scandent shrubby species of *Angelonia* (*A. bracteata*, Benth.), &c. The herbaceous plants consisted of various species of *Cleome*, *Physostemon*, a *Loasa* (*L. rupestris*, Gardn.), several *Hyptids*, a *Preslea*, *Angelonia arguta*, Benth., with *A. serrata*, Benth., and *A. pubescens*, Benth., a beautiful little species of *Echites*, about six inches high, with very narrow leaves, producing several flowers, similar both in appearance and colour to those of *Phlox verna*. It has large black

tuberous roots, similar to a black turnip-radish, many of which I sent to England, but they do not seem to have vegetated.

No. 6.—*The Vegetation of the Province of Piauhý, in Brazil, and the District of Rio Preto.* By George Gardner, F.L.S., Director of the Royal Botanic Gardens, Ceylon.

The province of Piauhý is a large flat tract of country, which, from the nature of its soil and climate, is only adapted for the rearing of cattle. It is only in its northern parts that some large plantations of cotton exist. It is separated from the province of Ceará by the mountain range already spoken of, and on the west it is bounded by the Rio da Parnahiba, which separates it from the province of Maranham. It is of great length, extending from north to south between the second and twelfth degrees of south latitude. The *fazendeiros*, or farmers, of this province divide it, from the nature of its vegetation, into two great regions. To the first of these they give the name of *Campos Mimosos*, and to the other that of *Campos Agrestes*. The *Mimoso* country is that which lies between the low country of Piauhý and the upper parts of the low mountain range that bounds it on the east. The forests which cover it are *Catinga*; and, as Martius has well observed, the general vegetation is distinguished by the tenderness of fibre, rigidity of the leaves, the presence of hairs, stings, or prickles, smaller flowers, thicker, and frequently milky juice. The grasses are for the most part annual, are generally of a brighter green colour, and have more tender and pliant leaves than those peculiar to the *Campos Agrestes*. They consist of various species of *Paspalus*, *Panicum*, *Gymnopogon*, *Vilfa arguta*, *Cenchrus elegans*, *Calotheca barbata*, *Chætaria capillaris*, *Bromus spicatus*, &c. The cattle reared in these districts bring much higher prices than those from the *Agreste*. The *Campos Agrestes* are for the most part more open than the others, and the grasses, which are mostly perennial, are much ranker and coarser, consisting chiefly of different species of *Andropogon* and *Trachypogon*. Although much of the forest of these tracts is also *Catinga*, the trees are mostly different from those in the *Campos Mimosos*. There are also, sometimes, large swampy tracts in the *Agreste* country, in which grow clusters of the *Buriti* palm. The cattle in the *Agrestes* are less liable to suffer from droughts than those which feed in the *Campos Mimosos*. From Vaze da Vaca, a journey of twenty-one days brought us to the city of Oeiras, the capital of the province of Piauhý. On this journey I did not meet with many trees in flower. One of the most remarkable of these was

a species of *Jatropha*, about forty feet high, with small white flowers, and sinuate leaves, not unlike those of the holly, but larger. The footstalks of the leaves are furnished with a few long-pointed prickles, and without being aware of the nature of them, I laid hold of a branch to collect a few specimens, but had no sooner done so than my whole hand felt as if it had been dipped into boiling oil, from the venom of the prickles, which in many places had punctured the skin; and it was not for many hours that it ceased to be intolerably painful. It is called *Favella* by the inhabitants of the country, and they employ the bark and wood of it to poison pigeons and other birds which come to drink in stagnant pools of water in river courses in the dry season. Towards Oeiras we passed through some large forests of *Carnahuba* palms. A revolutionary movement in the neighbouring province of Maranham compelled me to remain in that city about four months, and in consequence I was enabled to make large collections of the plants of that district, and that, too, at one of the best seasons for doing so. I was the first Englishman who penetrated into that distant quarter of Brazil, but not the first botanist; for about twenty years before me Martius spent a few days in Oeiras on his overland journey from Bahia to Maranham. From the vicinity of this city my Herbarium contains upwards of 400 species.

The city is situated in a large circular valley, about a league in breadth. The hills around it, as well as a few in it, are low, and composed of a soft whitish-coloured sandstone. The principal herbaceous vegetation consists of several species of grasses, many curious ones of *Evolvulus*, a few of *Hyptis*, *Stilpnopappus*, *Leguminosæ*, *Malvaceæ*, *Rubiaceæ;* and in the sandy fields the greatest plenty of the beautiful little annual *Angelonia cornigera*. Some of the shrubs are very fine, such as an *Allamanda* (*A. verrucosa*, Gardn.), about six feet high, bearing large lemon-coloured flowers; many pretty *Mimosas*, numerous white, yellow, orange, pink, and purple flowered species of climbing *Bignoniæ;* both erect and climbing *Malpighiaceæ;* several kinds of *Turnera*, *Cæsalpinia*, *Bauhinia*, *Helicteres*, *Vernonia*, *Myrtaceæ*, &c. The trees are small, and not numerous. Among them may be noted the *Cashew*, a *Mouriria*, a fine *Qualea*, bearing large yellow flowers, a *Callisthene*, two species of *Copaifera*, *Salvertia convallariodora*, numerous *Leguminosæ*, such as the *Jatobá* (*Hymenæa*), and the beautiful *Martia parvifolia*, Benth., bearing large panicles of orange-coloured blossoms, and large flat-winged crimson-coloured pods; a large pink-flowered arboreous *Bignonia*, a *wild fig*, the *Piki*, and the *Tingi*. The range of hills which surround the city do not rise more than 500 feet above the surrounding level country,

but, notwithstanding, their vegetation differs very much. On open rocky places I observed abundance of a species of *Vellozia*, and a little *Barbacenia*, which are perhaps the most northern species of the tribe to which they belong, its great centre being on the mountains of the Gold and Diamond district. Neither of these species were in flower. Here, also, I met with a fruticose species of *Euphorbia*, several suffruticose *Leguminosæ*, a fine heath-like *Cuphea*, and a prickly-leaved Aloe-like plant, which throws up a flowering stem to the height of ten or twelve feet; several *Compositæ*, *Crotalariæ;* and, in the clefts of rocks, the lovely annual *Gloxinia Sarmentiana*, Gardn.; *Adiantum filiforme*, Gardn.; two or three species of *Anemia*, a *Schultesia*, and a very small *Eriocaulon.*

In consequence of the revolution above mentioned, I found it impossible to make the journey to the westward I had originally intended. Unwilling to retrace my steps, I determined to proceed southward to Rio de Janeiro, through the great inland provinces of Goyaz and Minas Geraes. The south of Piauhý being also in an unsettled state, I was advised by influential persons not to pursue this proposed journey, as I should run a great risk of losing my life by so doing; but my strong desire to pass through a hitherto unexplored country determined me not to listen to their advice. Till we reached Parnagoa, a small town towards the southern extremity of Piauhý, our route lay through an *Agreste* country. Although the season was far advanced, I collected on this journey upwards of 200 species, not a few of which are new. Among them I may mention a curious *Cabomba* (*C. Piauhyënsis*, Gardn.), a *Drosera*, several remarkable *Eriocaulons*, two small white-flowered species of water-lily, one of them (*Nymphæa fragrans*, Gardn.) with very sweet smelling flowers, and the other (*Nymphæa fœtida*, Gardn.) smelling strongly of coal-tar; a large *Vellozia*, several *Gomphias* and *Mouririas*, some handsome *Loranthaceæ*, *Jussiæa sedoides*, several *Palms*, many *Leguminosæ*, and not a few *Compositæ*. From Parnagoa we went on to Santa Maria, a little beyond the southern boundary of Piauhý, passing through a more elevated country, and consequently more interesting to the botanist. Here I met with many beautiful *Melastomaceæ*, *Compositæ*, and *Eriocaulons*; a *Diplusodon*, the most northern, perhaps, of the genus; a fine *Gomphia*, a *Callisthene*, a large *Bombax*, one of the most handsome *Cyrtopodiums* I have met with in Brazil, and a beautiful large leguminous tree (*Commilobium polygalifolium*, Benth.).

The district of the Rio Preto, so called from a beautiful little river of the same name that flows through it, is the south-west portion of the long narrow province of Pernambuco, which ex-

tends from east to west over eleven degrees of longitude. This district separates the provinces of Piauhý and Minas Geraes from each other, and is bounded on the west by that of Goyaz, to which it was now my intention to proceed. The country here is of considerable height, being the continuation of the Serra which we crossed on passing from Ceará into Piauhý. Our course was now directly westward, and the journey was of the most fatiguing description, being through an uninhabited country; it was also attended with much danger, owing to a tribe of Indians from the Rio Tocantins, whose hordes had been infesting the neighbourhood of Santa Maria some time before our arrival there. Both myself and my men were, however, well armed; but fortunately during this painful journey of about ten days, which brought us to an Indian mission called Duro, we did not need to make use of them. Our route was principally along the banks of the Rio Preto, sometimes leading through dense woods, sometimes through open moist *Buriti* palm swamps, and sometimes over dry sandy bushy tracts, nearly destitute of herbaceous vegetation. In this district I made some splendid collections. Among the trees I may mention a fine *Terminalia*, a very large species of *Qualea*, the unbranched stem being more than one hundred feet high, *Xylopia grandiflora*, St. Hil.; a *Bombax*, two *Vochysias*, a *tree-fern*, the only one met with till I reached the Diamond country; a *Monosis*, a *Mouriria*, and several *Myrtaceæ* and *Leguminosæ*. But by far my richest harvest was among the flowering shrubs, which consisted of numerous beautiful species of *Melastomaceæ*, *Myrtaceæ*, *Compositæ*, *Vellozias;* several fine *Davillas*, *Anonaceæ*, *Polygalas*, *Malpighiaceæ*, *Gomphias;* many *Leguminosæ*, together with several species of *Viscum*, a *Vaccinium*, a *Jacaranda*, a *Krameria*, &c. In the moist campos, and along the banks of the river, many herbaceous plants also presented themselves, such as about a dozen and a half of curious *Eriocaulons*, one of them a splendid branched species, about six feet high; a *Lobelia*, a *Gesnera*, *Conobea aquatica*, Aubl.; numerous suffruticose kinds of *Hyptis*, a variety of *Grasses* and *Cyperaceæ*, and a few *ferns*.

Before leaving the mission of Duro we had to cross an elevated table-land about forty miles in breadth, perfectly level, entirely destitute of water—one of the greatest luxuries in a tropical climate—and for several leagues destitute of either arboreous or shrubby vegetation. At the base of this table-land I met with a few fine *Melastomaceæ*, a very small-leaved *Callisthene*, and, in a marsh by the side of the river, I collected fine specimens of an *Isoetes*, which does not seem to differ from *I. lacustris*, Linn. On the ascent grew one or two fine species of *Kielmeyera*, beautiful shrubs belonging to the natural order

Ternstrœmiaceæ. Some part of the top of the table-land itself was covered with great patches of the beautiful and highly odoriferous *Spiranthera odoratissima* of St. Hilaire. It is a suffrutex, about a foot or a foot and a half high, with pure white blossoms, not unlike at first sight those of the honeysuckle, but larger, and with a smell somewhat similar, but much more powerful; a pretty dwarf species of *Myrcia*, and what appears to be a very distinct species of *Anacardium*, growing gregariously, and bearing both flowers and fruit, though only about a foot high. The fruit is very much smaller than that of the common cashew, but the leaves are about the same size, and somewhat differently shaped.

No. 7.—*The Vegetation of the Province of Goyaz, in Brazil.* By George Gardner, F.L.S., Director of the Royal Botanic Gardens, Ceylon.

The aldêa of Duro is situated on a serra of the same name, being the termination of the Serra Geral, which runs down from the south, and divides into two great branches a little to the north of the mission of Duro. The mission was founded more than a century ago, and is now fast falling into decay; it contains about 250 persons in all; by far the greater part of whom are but little removed in point of civilization from their savage brethren of the woods. I remained among them a fortnight, and during that time made many excursions into the surrounding country, by which many fine additions to my collections were made. The climate is much cooler than that of the low lands, either of the lower parts of the province of Goyaz itself, or of that of Piauhý. The country belonging to the mission amounts to twelve square leagues, and is one of the most beautiful I have seen in the north of Brazil. It consists either of large open grassy undulating campos, or of moist sandy ones, both intersected by stripes of low woods in the hollows. Some of the flatter grassy campos are thinly wooded with small trees, and both there, and on the open ones, numerous beautiful little shrubs and herbaceous plants, giving the fields a gay appearance. In this district I met no very large trees, the largest I could determine being species of the following genera:—*Vochysia*, *Qualea*, *Callisthene*, *Mouriria*, *Laplacea*, *Kielmeyera*, *Laurus*, *Hancornia*, &c. One of the *Vochysias* was splendidly in flower, and very common by the side of the cool limpid stream that passes close by the Aldêa, its long spikes of yellow flowers rendering it a conspicuous object. The *Hancornia* is a new species, to which I have given the name of *H. collina*. It is called by the Indians *Mangaba do morro*. The fruit is much larger than

that of the one which is so common about Pernambuco, and the flavour still more delicious. A few small *Palms* exist in the woods, the small nuts of which form a principal article in the food of the Indians. The shrubs found in the woods consist of various species of *Myrtaceæ*, *Myrsinaceæ*, and *Rubiaceæ*. One of the most beautiful among the latter is a species of *Augusta*, which bears a profusion of crimson flowers about three inches long. It is a shrub from two to four feet high, growing by the sides of streams in shady places, with its roots almost always covered with water. In drier parts of the woods a climbing *Norantea*, similar to that found at Pernambuco, and equally beautiful, was also common. The shrubs in the campos consisted of various species of *Helicteres*, *Anona*, *Lecythis*, *Erythroxylum*, *Malpighiaceæ*, *Oxalis*, *Gomphia*, *Bauhinia*, some of them erect, and with simple leaves, *Melastomaceæ*, *Diplusodon*, *Passiflora*, *Lippia*, *Croton*, *Jatropha*, &c. Besides these, I met with single species of the following genera:—*Heisteria*, *Vellozia*, a fine large plant, and very common, but unfortunately not in flower; a *Myristica* growing gregariously in dry sandy places, and not more than four feet high; and a most beautiful little shrub, probably a species of *Jacaranda*, growing in patches about a foot square, not more than a foot high, and bearing a profusion of pale yellow Bignonia-like flowers. The *Diplusodons* are beautiful little shrubs, belonging to the natural order *Lythrarieæ*, and are peculiar to the upland grassy and sandy campos of the interior of Brazil. They have mostly narrow heath-like leaves, and rose-coloured or violaceous, rarely white, flowers, which are produced in the greatest profusion. The herbaceous plants of the open upland campos around Duro consist of various species of *Cissampelos*, *Sauvagesia*, *Leguminosæ*, *Vernonia*, *Ichthyothere*, *Chresta*, and other *Composites*, *Echites*, *Convolvulus*, *Ipomœa*, *Hyptis*, and *Peltodon*. Of these the most ornamental were *Chresta exsucca*, which produces large heads of pale purple flowers; two kinds of *Echites*, one of them about two feet high, with broad smooth leaves and numerous rose-coloured flowers, measuring more than two inches across, the other with decussate long narrow leaves, white underneath, and white flowers with very long tubes; and an *Ipomœa* (*I. hirsutissima*, Gardn.), from six to eight inches high, growing in little tufts, very hairy in all its parts, and with large violaceous flowers. From its small size, peculiar habit, and really beautiful flowers, this would be a most desirable plant for cultivation. Along with these grew many species of *grasses*, a curious leafless *Crumenaria*, an *Alstrœmeria*, two species of *Amaryllis*, one of them the long yellow-flowered *A. solandræflora*, Lindl., and two fine kinds of *Cyrtopodium*. In the dry sandy campos grew the only plant

belonging to the *Cactus* tribe I met with here, a species of *Mammillaria*, measuring about four inches across. In the moister campos *Eriocaulons* were common, as was also a beautiful new species of the curious genus *Abolboda*, with much larger flowers than the original species figured by Humboldt; and two species of *Rapatea*, one of which is the *R. paludosa* of Aubl. In moist places, among bushes, grew a fine large species of *Eryngium*, a tall suffruticose *Ichthyothere;* and in dry places of a similar nature, a very handsome sun-flower-like species of *Leighia* (*L. grandiflora*, Gardn.), with flowers about three inches in diameter. *Ferns* were very rare, all that I met with being a single species of *Adiantum*, and a small *Lycopodium.*

Leaving Duro, and entering the level country to the westward, a journey of twelve days brought us to the Villa de Natividade, a little to the east of the banks of the great Rio Tocantins, which empties itself into the Amazon. The rainy season had now set in, which in such wild countries renders travelling very difficult. To avoid such, and to give my horses a rest, I determined to remain here till the heaviest of the rains would be over. A residence of upwards of three months, notwithstanding the heavy rains, enabled me to accumulate a large herbarium of the vegetation of the surrounding country, which, with the exception of one high serra which runs from south to north, is very level. The low country very much resembles the *Campos agrestes* of the south of Piauhý; but the soil is more argillaceous and gravelly, being principally formed of the *débris* of primitive rocks. It has been turned up in all directions in search of gold, which formerly used to be found in abundance. The stripes of forest which intersect the campos here have not much large timber in them, and they are for the most part evergreen. One of the largest of the trees which compose them is a species of *Couratari* (*C. rubra*, Gardn. MSS.). Among the other trees which I met with in flower here I may mention the following:—a fine *Byrsonima*, with broad woolly leaves; an *Amphilochia*, *Commilobium polygaliflorum*, Benth., called *Sicupira* by the Brazilians; two species of *Ilex*, both small trees; a new species of the curious genus *Tapura* (*T. ciliata*, Gardn.), a *Sapindus*, &c. One of the finest small trees in the woods here is the *Physocalymna florida*, Pohl., which produces large panicles of rose-coloured flowers, and, like the *Diplusodons*, belongs to the natural order *Lythrariæ*. Mr. George Don, in his edition of Miller's Dictionary, has committed a great error with regard to this tree, in asserting that the wood of it is the true Rose-wood of commerce. It has neither the size nor the colour of rose-wood, and moreover the *Physocalyma* is not known out of the province of Goyaz; while the true Rose-wood, which belongs to

the natural order *Leguminosæ*, exists in the forests between the Gold and Diamond districts and the coast. Poeppig has caused another error to be committed by a species of *Physocalymna*, which he has figured and described in his *Nova Genera* as a *Diplusodon*. Dr. Lindley, in a number of the Gardener's Chronicle for 1841, has given a woodcut of this figure as an illustration of the genus *Diplusodon*, to which it no more belongs than a species of *Lagerstrœmia* does. The flowers of the *Diplusodons* are always axillary, never paniculate. The woods and campos were rich in shrubs, such as *Rubiaceæ*, which were very common, in the shape of such genera as *Coffea*, *Faramea*, *Palicourea*, *Psychotria*, *Cephaëlis*, *Sabicea*, &c.; *Melastomaceæ*, *Myrtaceæ*, *Leguminosæ*, *Compositæ*, *Lantanas*, *Diplusodons*, &c. I made several excursions to the summit of the serra, and was richly rewarded by the number of new plants they yielded. The general appearance of this mountain range is very different from that of the Organ Mountains, being almost entirely destitute of arboreous vegetation, there existing only a few small trees and shrubs in sheltered situations. It consists entirely of primitive rocks, such as compact limestone, arenaceous schistose rocks, and granite. In boggy places, about half way up, I collected a *Drosera*, two small species of *Burmannia*, *Sauvagesia racemosa*, St. Hil., a fine yellow-flowered *Cyrtopodium*, with very long leaves, and flowering stems upwards of six feet long, and another splendid terrestrial Orchideous plant, a reed-like plant about three feet high, with very large rose-coloured flowers, belonging to the genus *Cleistes* (*C. speciosa*, Gardn.). In gravelly places, which were evidently abandoned gold-washings, grew three fine species of *Anemia*, two beautiful *Alstrœmerias*, and two erect species of *Ipomæa*, one of them (*I. neriifolia*, Gardn.) about two feet high, and very handsome, having long narrow oleander-like leaves, and numerous large pale rose-coloured flowers. At a greater elevation I met with a few fine ferns growing in dry rocky places. One of these was a beautiful *Adiantum* (*A. sinuosum*, Gardn.), with large sinuated leaflets, the curious *Cassebeera pinnata*, Kaulf., and two species of *Notholæna*. Near the summit the clefts of the rocks are full of a beautiful suffruticose *Achimenes* (*A. rupestris*, Gardn.), but of which I only found a single specimen in flower. In clefts of the rocks on the summit itself I found another curious little Gesneraceous plant in flower, a species of Tapina (*T. villosa*, Gardn.), and two beautiful little ferns, both of which proved to be new genera. They both belong to the same tribe as *Anemia*, and one of them, which grows flat on the rocks, and not larger than a crown-piece, I have published a figure and description of in the first volume of Hooker's London Journal of Botany, under the name of *Tro-*

chopteris elegans; and the other in Hooker's Icones Plantarum, under the name of *Coptophyllum buniifolium.* Of the latter genus I met with a much finer species some time afterwards in a more southern part of the province. Besides many other fine plants, this serra afforded me three species of the genus *Vellozia* in flower, two of them low-growing plants, the one with large white flowers, the other with purple ones, and the third, from four to six feet high, also bearing numerous purple blossoms. One of the most remarkable plants of this serra grew also near the summit; but, unfortunately, it had not come into flower before I was obliged to leave. On one plant I found one or two flowers just sufficiently advanced to enable me to determine that it belongs to the natural order *Umbelliferæ.* It will most likely prove to be either a species of *Klotzschia*, or some other genus belonging to the same tribe of *Hydrocotylæ.* It is a suffruticose plant, reaching from six to ten feet high, with large peltate leaves, the lower ones of which measure about two feet in diameter. On limestone rocks belonging to the same range, but about two leagues farther north, I likewise met with a few good plants, such, for example, as a fruticose *Gesnera*, a fine annual? species of *Gloxinia*, about a foot and a half high, with purple axillary blossoms, the middle lobe of the under lip of which has its margin toothed and turned inwards, so as exactly to resemble the lower jaw of a fish, from which peculiarity I have named the species *G. ichthyostoma;* two or three curious species of *Habenaria*, a climbing *Alstræmeria*, beautiful *specimens* of *Gloxinia Sarmentiana*, much finer than those which I first met with near Oeiras, several fine *Marantaceæ*, an *Anemia*, and in the clefts of the dry limestone rocks, a pretty little *Adiantum* (*A. calcareum*, Gardn.). Sandy campos near this place afforded me a fine lilac-coloured *Lisianthus*, a few *Habenariæ*, a pretty *Peltodon*, an *Asclepias*, and many *Composites* and *Grasses.*

In the month of February 1840, the rains having abated considerably, I left Natividade, and, pursuing a S.E. course, reached Villa de Arrayas, another small town towards the eastern boundary of the province. Till the rains would enable me to proceed on my journey southward, I remained here about two months, amassing a splendid collection of those plants which are peculiar to the upland grassy campos of the interior of Brazil. Arrayas is situated in a little valley on the top of a broad hilly elevated serra; and, as the country around it is very diversified, I considered myself fortunate in being placed in such an excellent field for my researches. The vegetation here was very different from any I had hitherto met with, and I spared no exertion to obtain as many species as were to be had in flower. The trees in these upland campos are mostly small, consisting chiefly

of the beautiful *Sicupira* (*Commilobium polygaliflorum*), two species of *Qualea*, a *Salvertia*, a *Vochysia*, two species of *Panax*, an *Albertinia*, a *Lafoensia*, two species of *Cecropia*, a *Cerasus*, several *Mimosas*, and the *Hancornia* found at Duro. Here, as at Duro and Natividade, the shrubs were very fine, consisting of various species of *Diplusodon* and *Kielmeyera*. One of the latter is very handsome, being a bush only about two feet high, covered with large rose-coloured blossoms. It is called by the inhabitants "*Rosa do Campo*." Composites were perhaps more common here than in any other part of the country I visited, consisting of various species of *Vernonia*, *Chresta*, *Eupatorium*, *Baccharis*, *Ooclinium*, *Mikania*, *Calea*, *Trixis*, &c. The campos were rich in *Grasses*, the mass of them, however, belonging to the genus *Andropogon*; and the beautiful *Lisianthus amplus*, Mart., with its large purple flowers, was very common. Two elegant species of *Callopisma*, also belonging to the *Gentianeæ*, were even in still greater abundance. One of them grows from four to six feet high, very slender and unbranched, and bears a large, lengthened, compact panicle of either pure white or pale rose-coloured blossoms. Its leaves are connate, and this gives rise to its native name of *Boca do Sapo* (Frog's mouth), the leaves themselves being rounded at their apices. It is also called *Centaurea maior*, and, being a bitter, is occasionally used as a tonic in infusion. In the month of April the fields are full of it, and it is conspicuous above all the other herbaceous vegetation from its graceful habit. The other species is much smaller, with flowers of a deeper colour. It is in all its parts intensely bitter, and is very generally collected and used as a tonic. It is in fact the Gentian of the inhabitants of the province of Goyaz, and is called by them, from its smaller size, *Centaurea minor*. In similar places I collected numerous species of *Hyptids*, a beautiful dwarf *Vellozia*, a splendid scarlet-flowered shrubby *Ruellia*, some fine *Justiciæ* and *Verbenaceæ*, a few *Jatrophæ*, *Melastomaceæ*, &c. Ferns were fewer here than at Natividade; two species of *Acrostichum*, a *Pteris*, an *Adiantum*, a *Hemionitis*, a *Trichomanes*, and the second species of my new genus *Coptophyllum* (*C. millefolium*, Gardn.), being all that I met with. In all, 300 species different from my former collections were obtained in the neighbourhood of Arrayas.

The proper season having at last arrived for travelling in these countries, I became desirous to resume my expedition, so as to reach Rio de Janeiro if possible before the setting in of the next rains. Travelling as quickly as the nature of my pursuits and the roads (if roads they can be called) would permit, a journey of a month brought us into that portion of the province of Minas Geraes which lies to the west of the Rio de San Francisco.

Our route was a very unfrequented one, lying partly along the western base of the Serra Geral, and partly on the table-land of the serra itself, through the south-west portion of the province of Pernambuco. The country through which we passed before ascending the serra was a beautiful undulating one, consisting of open grassy campos, sometimes studded with large wide-spreading trees, reminding us of the fields of our own distant isle, intersected by small streams from the mountains, the banks of which were generally lined with a narrow stripe of small trees and bushes, above which were often seen to rise the graceful shafts of the tall Buriti Palm, crowned with its noble head of fan-shaped leaves. Splendid collections were again made on this journey. The trees which were met with in flower were the following:—a fine large *Bombax*, *Chorisia crispiflora*, H. B. et K., a *Copaifera*, a *Hymenæa*, a few species of *Vochysia*, *Strychnos pseudo-china*, St. Hil., the bark of which is very bitter, and used by the inhabitants in the cure of ague, various species of *Styrax*, *Luhea*, *Laurus*, *Myrtaceæ*, a *Zizyphus*, and a few fine large wild *Fig-trees*. Some time after leaving Arrayas we passed through a very dense forest, about a league in breadth, and of much greater length. In it I found a few Orchideous plants, the finest that was in flower being an *Oncidium* (*O. macropetalum*, Lindl.). If more time could have been spared, I have no doubt that many fine Epiphytes might have been found here. As it was now the season in which the greater part of the shrubs in the campos flower, I obtained specimens of an immense number. They consisted chiefly of *Diplusodons*, some of which were most beautiful little shrubs, *Gomphias*, *Melastomaceæ*, *Myrtaceæ*, *Malpighiaceæ*, a few shrubby species of *Oxalis*, *Rubiaceæ*, *Vernonias*, and other *Compositæ*, the most beautiful of which are two kinds of *Chresta* (*C. sphærocephala* et *C. exsucca*), both of which bear large heads of pale purple flowers, *Flotovias*, and numerous species of *Baccharis*. One little hill we passed over was covered with a very handsome and curious shrub, the *Antonia ovata*, Pohl. It belongs to the natural order *Loganiaceæ*, and produces large corymbs of white, very sweet-smelling flowers, the calyces of which are much imbricated. *Zeyheria montana*, Mart., was also common, as were likewise several species of *Heliotropium*, *Virgularia*, *Lippia*, *Stachytarpheta*, &c. *Compositæ* were the most abundant part of the herbaceous vegetation, in the form of various species of *Vernonia*, *Elephantopus*, *Ooclinium*, *Stevia*, *Eupatorium*, *Bidens*, *Calea*, *Porophyllum*, *Trixis*, &c. I also met with several species of *Lisianthus*, *Schultesia*, *Callopisma*, *Amaranthaceæ*, *Hyptids*, an *Angelonia*, and numerous *Gramineæ* and *Eriocaulons*. The only *Ferns* were a *Lomaria* and a *Parkeria*. On the table-land of the serra the general aspect of the country was somewhat

similar to that we left below; but the climate was much cooler, and, from the roads being but little frequented, our journey across it was painful in the extreme. Myself, my men, and my horses were often more than half starved for want of provisions. It was seldom that we could meet with either armadillos or *monkeys* on the high lands, the large ant-eater and the ostrich being the only wild animals we encountered, neither of which are fit to eat, from the smell which their food, the white ant, gives to their flesh. The plants met with here were for the most part mere different species of the genera found in the plains, the elevation not being great.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

10. Gesnera breviflora.*

Received from G. U. Skinner, Esq., in April, 1847.

Stem simple, a foot high, green, covered with long spreading hairs. Leaves dark green above, somewhat hoary beneath, oval, opposite, 6 or 7 inches long, with a stalk about an inch long. The flowers are very shaggy, $\frac{3}{4}$ inch long, bright rich red, and appear in fours in the axils of the upper leaves, so as to produce the appearance of a raceme.

The plant is near *G. allagophylla*, from which its leaves and leafy inflorescence abundantly distinguish it.

A pretty half-shrubby stove-plant, growing freely in a mixture of sandy peat and leaf-mould. It is easily increased by the roots, which are composed of scales like those of Achimenes.

It is a desirable plant, which may be had in bloom nearly all the year, if treated like Achimenes.

Sept. 29, 1847.

Since the above was written, a *Gesnera triflora*, nearly related to this, has been published in the Botanical Magazine (t. 4342). From that plant *Gesnera breviflora* seems to differ in having its peduncles simple, not trifid, and shorter, not longer, than the petioles; in the stem being covered with shaggy hairs instead of rusty down; and in a tendency to form a leafless raceme, which is not indicated in the figure and description of *G. triflora*.

11. Iris reticulata. *Marschall von Bieberstein, Flora Taurico-caucasica*, vol. i. p. 34.

Purchased at the sale of the late Dean of Manchester.

Of this very curious and beautiful Iris the leaves are perfectly erect, a foot long, one or two to each flowering plant, glaucous, and four-cornered, with a pale, curved, sharp conical point. The flowers are solitary, shorter than the leaves, proceeding from green closely rolled spathes, from which the angular tube

* G. *breviflora;* herbacea, caule patentim villoso, foliis ovalibus petiolatis crenatis convexis supra pubescentibus subtus petiolisque villosis, pedunculis unifloris quaternis in axillis foliorum superiorum villosis petiolo brevioribus, corollæ villosissimæ tubo pedunculi longitudine limbo æqualiter 5-fido laciniis obtusis, staminibus inclusis.—J. L.

projects from two to three inches; they are of the deepest purple, with a narrow, well-defined, pure yellow oblong spot at the end of the sepals, accompanied by some purple specks upon a paler ground. When brought into a room the flowers remain expanded for some days, and emit a faint but delightful smell of violets. The plant is found wild in the Crimea.

A hardy bulb, as easily managed as the hyacinth, growing freely in a compost composed of loam, well-decomposed cow-dung, and silver sand. It is increased by the bulbs, which should be kept quite dry when in a dormant state, and afterwards started at different times in September and October, for giving a succession of flowers in the spring.

A most valuable plant for pot culture in the spring, and which may rival all other spring bulbs, not only on account of its brilliant blue flowers, but because

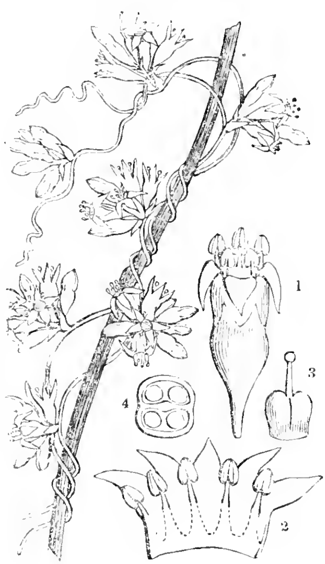
of its blooming so very early without any other protection than that of an ordinary green-house, and having at the same time the odour of the violet.

February 8, 1848.

12. CUSCUTA? CALIFORNICA. *Choisy, Monogr. Cusc.*, p. 183; *D. C. Prodr.* ix. 457.

Raised from seeds received from Mr. Hartweg, and said to be collected in fields near Sonomá in California.

This little parasite clings by its delicate thready stems to any branch or leaf within its reach. Its minute flowers are at first in close heads, but as it grows older they separate, and eventually form short loose racemes; their colour is white, and their smell very agreeable. Although Professor Choisy regards it as a true Dodder, it probably ought to constitute a new genus; for it has but one style, the peculiar scales within the corolla of the genuine Cuscutas are deficient, and the upper part of the flower-stalk is fleshy and transparent. In the accompanying cut, 1 represents a flower magnified; 2, a corolla laid open; 3, a pistil; and 4, a cross section of the ovary.



The seeds should be sown along with those of some soft-stemmed annual in pots; and when strong enough, and before it destroys the annual plant which it first grew upon, some soft-wooded shrub, such as Lotus Jacobæa, or Pelargonium, should be brought within its reach; it will soon adhere, and grow freely upon it.

It is a free-blooming little parasite, more curious than ornamental. *Oct.* 10, 1847.

MEMORANDA.

The *Shantung Cabbage*, sown in spring and planted out in rich soil, has run to seed without forming a heart, the weather having been too hot and dry. Probably, as in the case of the Pe-tsai, the month of August will be found the best time for sowing it.—Robert Thompson.

Peas.—The following varieties of Peas were sown, in contiguous rows, March 13th :—

1. *Pois le plus hâtif* (True Early Frame), from Vilmorin.
2. *Early Frame*, from Mr. Glendinning.
3. *Early Frame*, from Mr. Warner.

The above proved the same and true—fit to gather June 9th.

4. *Early Kent*, Mr. Glendinning. Fit June 2nd.
5. *Warner's Early Emperor.* Fit June 4th.

The 4th and 5th are varieties allied to the Early Frame; from the latter the Early Kent differs in being a week earlier, and not so strong growing.

Warner's Early Emperor is not quite so early as the Early Kent; and its growth is intermediate between that of the Early Kent and Early Frame.

Fairbeard's Early Surprise Pea was sown April 23d, and was fit to gather June 27th. But the Early Frame sown at the same time was fit June 19th. Fairbeard's is therefore eight days later than the Early Frame; and consequently, according to the preceding statement, it would be a fortnight later than the Early Kent. Hence, although it is not a late pea, yet it cannot rank amongst the earliest. It seems a variety of the Charlton; but owing to the excessively hot weather, nothing can be fairly stated with regard to its quality and bearing.

The *Transparent Pea* from Mr. Charlwood proves to be the same as *Farnes's Conservative Green Marrow*, a singular variety, the foliage being destitute of the usual glaucous covering.—Robert Thompson.

Manures.—Two squares of ground, equal in size, were staked out, where the turf was taken up and relaid, near the Exhibition Tent, in February, 1846; the first square had a portion of Peruvian guano dusted over the surface of the ground previous to laying down the turf; the second square had the same quantity of guano applied as a top dressing immediately after the turf was laid down. That square which had the guano as a bottom dressing began to appear greener than the other in about six days; the other square, with the guano as a top dressing, began to appear greener than the ordinary grass in ten or twelve days. That square which had the guano applied as a bottom dressing was much the strongest, longest, of a darker green, and altogether much superior to that which had the guano applied as a top dressing. The grass was cut about the beginning of May, in consequence of the near approach to the Garden Exhibitions; after that time little difference could be observed, in consequence of the place being much trodden upon by the visitors to the Exhibition.

Heming's new vegetable manure produced no effect on the grass in the Arboretum, either at the rate of 2 lbs. or 4 lbs. weight to the square rod.

Daniel's white manure, tried also on the grass in the Arboretum at the rate of 2 lbs. and 4 lbs. to the square rod, both in September and beginning of March, produced no effect.—George Gordon.

REPORT FROM THE COUNCIL

TO THE

ANNIVERSARY MEETING, MAY 1, 1848.

THE Council in making their Annual Report to the Horticultural Society regret that they cannot claim exemption from the consequences resulting from a year of unprecedented distress, both social and commercial. Though their finances, in common with those of all similar institutions, have suffered, they are happy to state that they see no reason to suppose that the public interest in Horticulture has diminished; and while they have to lament the loss of an unusual number of Fellows from death, or from resignation in consequence of impaired incomes, they have also to report the accession of forty new Fellows, a number not much below the average.

The financial statement by the Auditors, which accompanies this Report (Appendix A), explains the different heads of receipt and expenditure, and it also draws a comparison between the assets and liabilities of the Society.

With the prospect of diminished resources, the Council have felt themselves imperatively called on to exercise the strictest economy in every branch of ordinary expenditure, and to incur no liability that could be avoided; they have therefore declined to sanction any outlay of money on new works at the Garden.

Complaints having been made in the summer of 1847 of deficient and irregular attendance in the Library and Accountant's Office, the Council directed a register-book of attendance to be kept, in which all paid officers should insert their hours of arrival and departure—a practice adopted at many of the public and Government offices.

The Librarian having declined to comply with this regulation, the Council accepted his resignation, which they received with much regret, as it deprived them of the services of an able and excellent officer, who had been many years in the employment of the Society. Punctuality of attendance during office-hours is essential to the proper discharge of the various duties connected with this

office, which includes not only giving information to Fellows and the Public, but receiving subscriptions; and it appears to the Council that in accepting the resignation of this officer they adopted the only course which could with propriety have been taken.

The Accountant-Clerk at first objected to register the time of his arrival and departure; but after a month's refusal, and having been brought before the Council, he submitted. He had brought vague charges of mal-administration against the Vice-Secretary and Council, and though repeatedly called on, in writing by the Secretary, and verbally by the Council, to specify the acts to which he alluded, he had always refused to do so, excepting in one case, which the Council had investigated in December 1845, and which was then explained to their entire satisfaction. Having been irregular in his attendance, and negligent in the performance of his duties, he received notice of discontinuance; and at last, having acted with gross impropriety towards the Auditors and Vice-Secretary while in official attendance upon them, he was summarily dismissed. The Council ought, in fact, to have removed him long before, and had only retained him from a feeling of indulgence towards one who had been for many years in the service of the Society.

Upon the recommendation of the Auditors the Council then placed the accounts of the Society in the hands of a public accountant, and appointed to this duty Mr. Andrew Duncan, of Tokenhouse Yard, a gentleman well known in the City, and in public offices, for his skill and probity.

They have also appointed to the office of Librarian Mr. W. Brailsford, who has been strongly recommended to them as a gentleman of intelligence and of high character, and who, they trust, will prove an active and valuable officer.

By these arrangements, together with some minor changes in Regent Street, the Council have effected a present reduction of 120*l.* per annum; at the same time they hope materially to increase the efficiency of this department.

Arrears.

In their two last Reports the Council have been obliged to draw attention to the want of punctuality of some Fellows of the Society in discharging their annual subscriptions, and to complain of a practice which loaded the account books of the Society with arrears. With a view to check this evil, the Council delegated to a Committee of themselves, with full powers to act, the duty of examining these arrears, and dealing with them.

The proceedings of the Committee have been approved and

confirmed by the Council, and are described in the following document, the perusal of which makes it obvious that there is great difficulty in dealing legally with many cases; and the Council submit to the consideration of the Meeting whether it may not be desirable to amend the Bye-Laws, or to seek for new powers in their charter.

"REPORT to the COUNCIL from the FINANCE COMMITTEE, agreed to March 23, 1848.

"THE Finance Committee think it desirable that they should now report to the Council what progress they have made in reducing the arrears due to the Society by Fellows. They therefore beg to state that their first meeting was held on the 16th of December, 1846, and their last, at which this Report was agreed to, on the 23rd of March, 1848. During this period they have held seven meetings.

In the course of their inquiry they have been furnished with various memoranda from the Treasurer and the late Accountant-Clerk, upon which and their own knowledge they have disposed of 325 cases, each case having been separately inquired into. The Committee have found that many names of Fellows have remained upon the Society's books, of whom some have long since formally resigned, leaving their arrears unpaid; others have alleged that they had resigned long since, although not formally, as required by the bye-laws, and the Society had no official knowledge of their intention; others are bankrupts or insolvents; others appear to be dead, although no such proof of their decease has reached the Society as would have justified their being struck off the list of the Fellows; others have been habitually in arrear, paying their subscriptions from time to time as suited their convenience; others have died leaving half a year's subscription unpaid; others have been elected subject to a nominal payment of half a year, which it is not customary to claim, and which should have been reported to the Council by the Accountant-Clerk in order that it might be cancelled. Moreover, they have found the names of many persons wrongfully inserted by the Accountant-Clerk in the list of Fellows, with many years' subscriptions accumulated against them, although, having never paid their admission-fees, they had never become Fellows, and consequently were not liable to any annual subscription whatsoever.

These cases have been divided by the Committee into three classes:—

Of the first class, consisting of persons against whom the

Society has no legal claim, or against whom it does not appear advisable to proceed, or who have prayed to be excused on account of poverty, or who have died leaving half a year's subscription undischarged, or who, not having completed their election, are not Fellows of the Society, or whose nominal half-year's subscription upon election should have been cancelled, the Committee has recommended 209 cases to be abandoned, the nominal amount of whose debts is 1493*l.* 12*s.*

Of the second class, consisting of persons against whom the Society has apparently a claim, but from whom there has appeared to be no means of procuring payment, or who have been bankrupts, or are known to be in insolvent circumstances, or who cannot be found, 62 cases have been examined, amounting to 2491*l.* 17*s.* All these cases have been placed in a separate list, in order that the debts due by them may not appear among the available resources of the Society. The Committee have thus avoided doing any act that would release the persons in this position from any legal liability they may be under to the Society, and their names can be replaced upon the payment of their arrears. In fact, since their cases were decided upon, two have done so and been reinstated.

A third class has been found to consist of Fellows who were clearly indebted to the Society, and about whose liability no legal doubt existed. Pressing letters have been addressed to them, in some cases through the solicitors, the result of which has already been the recovery of arrears to the amount of 710*l.* 13*s.* 6*d.*

There still remains a small number of cases of which the Committee has not been able to dispose, and which they leave for further consideration."

Transactions.

The third part of the 3rd Volume of the New Series of the Transactions, containing a complete Index to the whole 10 volumes, has been issued within the year, and brings to a close that part of the Society's publications. The Journal has continued to appear quarterly with perfect regularity.

Exhibitions.

The Exhibitions at the Garden have maintained their accustomed reputation, with the exception of Fruit, in the quality of which there has been so marked a decline, that the especial attention of the Exhibition Committee was directed to the sub-

ject. The Committee have recommended a better classification and more minute subdivision of prizes, together with the abolition of what were termed "Collections of Fruit," and an exclusion of Fruiterers from exhibition. By the new arrangement 26 heads of competition are provided instead of six. This largely increased variety of classes will, it is hoped, afford to every good fruit grower, however humble his means, a fair opportunity of exhibiting his skill.

Up to the beginning of May the sale of tickets had been unusually large, but at that time the weather became unfavourable, and greatly impeded the issue. The first meeting in May proved to be a day of gloom or incessant rain, and the number of Visitors was only 1644, more than 3200 below the number in May 1846, and representing only 1479 out of 11,580 tickets that had been issued. The second meeting in June was on a beautiful day, but it had been preceded by such continued rain, that the issue of tickets had been again diminished, and only 10,940 Visitors passed into the Garden, which was 2481 fewer than in 1846. On the third meeting, on which occasion his Grace the President, with his accustomed liberality, threw open the grounds of Chiswick House to visitors, 6827 persons passed the gates, a number considerably beyond that of 1846, notwithstanding that the day was ushered in with a tempest, and that the weather, although eventually fine, deterred many from using their tickets.

The loss in May and June was, however, never made up, and at the end of the year the ticket account stood thus, as compared with 1846:—

	1846.	1847.
Tickets issued at 3*s.* 6*d.*	9,254	9,661
,, at 5*s.*	12,610	10,340
,, at 7*s.* 6*d.*	2,053	1,072
	23,917	21,073
Fellows present without tickets	736	616
Total	24,653	21,689
Deduct Visitors	24,362	19,411
Tickets not used	291	2,278

The comparative cost of the Exhibitions in 1845, 6, and 7 will be seen from the following return.

EXPENSES OF THE EXHIBITIONS.

	1845.			1846.			1847.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.
Building large room for exhibitors	150	16	2	..			..		
Materials for orchestra, tables, &c.	89	19	10	45	5	5	..		
Miscellaneous timber	5	19	9	..			41	18	10
New tents	196	8	1	..			..		
Hire of tent, &c., for His Highness Ibrahim Pacha and suite	..			10	10	0	..		
Repairs of tents	3	10	0	8	18	6	12	9	2
Repairs of ladies' cloak-room and other rooms	4	12	3	7	3	2	..		
Oil, paint, &c.	17	14	0	18	8	1	13	12	7
New pump, &c.	4	0	10	..			..		
Miscellaneous ironwork	41	8	10	24	15	11	19	8	9
Turf, gravel, &c., and road repairs	18	15	6	85	14	0	39	2	0
Handbarrows, water-pots, &c.	5	16	9	5	13	6	25	6	6
Hats given to men belonging to the Garden	4	19	6	..			4	12	0
Carpenters, painters, tent-pitchers, &c.	208	0	10	152	16	5	162	10	8
Miscellaneous labour beyond what is required for the ordinary service of the Garden	234	19	11	308	3	3	295	13	4
Hire of crockery	13	14	2	12	13	0	12	13	0
Miscellaneous printing	74	1	6	85	0	6	70	18	0
Admission tickets	41	4	6	44	0	0	49	1	0
Advertisements	101	11	6	97	19	6	93	4	6
Sundry petty payments	35	4	1	3	1	0	21	10	4
Carriage, postage, &c.	28	14	0	32	15	6	30	15	3
Stationery	10	15	11	11	1	11	12	5	3
Cloak-room expenses	6	13	0	6	1	0	5	8	6
Judges	48	6	0	56	8	0	47	5	0
Extra clerks and hire of temporary rooms	33	2	6	39	5	6	54	1	0
Police	118	2	0	123	2	0	115	18	0
Bands and all musical expenses	342	2	6	349	15	0	314	4	0
Provisions for exhibitors, police, &c.	54	11	9	63	4	9	53	11	3
Watering roads	20	5	0	30	5	6	12	0	0
Medals	1182	5	0	1284	0	0	1262	0	0
Miscellaneous	2	6	4	..			13	10	5
Refreshments for His Highness Ibrahim Pacha and suite	..			33	4	3	..		
	3100	2	6	2939	5	8	2782	19	4

Upon the Exhibitions in Regent-street the Council have only to observe, that the value of Medals, &c. awarded at them has been—

In 1845–6	£77	10	0
1846–7	82	5	0
1847–8	81	10	0

that the number of Exhibitors has somewhat fallen off in consequence of the disordered state of commerce, and that the Council contemplate making changes with a view to the greater efficiency of these Exhibitions.

Collectors.

The only Collector now in the pay of the Society is Mr. Hartweg, concerning whose proceedings in California the Council has little information beyond what was published in last year's Journal, p. 187. They have received no further portion of his Journal, but they have had a very short letter from him, dated Monterey, July 17, 1847, advising them of the despatch of some living plants, which have since arrived in tolerable condition. The following are the most important of the plants received alive, or raised from seeds, within the year from this expedition.

Cupressus macrocarpa, *Hartweg.* A tree 60 feet high, from the sea-shore near Carmel Bay.
Pinus Benthamiana, *Hartweg.* A tree 100 feet high, from the mountains of Santa Cruz.
—— Sabiniana.
—— macrocarpa.
—— insignis.
—— californica? A tree 15–20 feet high, from the mountains of Santa Cruz.
Abies Douglasii. From the mountains of Santa Cruz.
Corylus. A shrub 6–8 feet high. Found in woods near Santa Cruz.
Rhamnus, called "Yerba del Os." A shrub 6 feet high. Monterey.
Quercus. Several species; one called the Chesnut Oak, another an evergreen, another with large sweet acorns.
Pavia Californica; the Californian Horse Chesnut.
Prunus. One or two species.
Calycanthus macrophyllus, *Hartweg.* A shrub 6 feet high, along the side of rivulets near Sonoma.
Laurus? A large tree from the mountains of Santa Cruz and Sonoma.
Arctostaphylos tomentosa.
Ceanothus. Two or three species; apparently C. rigidus, papillosus, and dentatus.
Garrya elliptica; the female.
Sambucus.
Hugelia. Some annual species.
Gilia pharnaceoides. An annual from the Carmel mountains.
Madaria corymbosa. An annual with white flowers. Found in fields about Sonoma.
A Lilium. Apparently new.
Several species of Lupinus, Aquilegia, Lathyrus, Malva, Leptosiphon, and Delphinium, &c. &c.
An Abronia; with pink sweet-scented flowers. A perennial spreading over the ground like a Verbena. From the sea-shore near Monterey.
Asclepias. A perennial species.
Nicotiana? A perennial with large white flowers.
Zauschneria californica. A very pretty perennial, found in fields about Santa Cruz.

Garden.

As has been already stated, the Council have not felt themselves justified in undertaking any new works in the Society's Garden. Even the erection of a reading-room, which would have been highly desirable, has been deferred.

With regard to the general condition of the Garden, the Council have a satisfactory Report from the Garden Committee, as will be seen by reference to Appendix B.

Some surprise having been expressed at the last Anniversary at the small amount of money which is received at the Garden for the sale of fruit, the Council made some suggestions to the Garden Committee upon the subject, and requested them to report thereupon. The Report made by the Committee will be found in the Appendix C.

APPENDIX A.

Thirty-ninth Annual Report of the Auditors.

The Auditors appointed at the last Anniversary beg to lay before the Society the annexed statement of the Receipts, Payments, and Liabilities of the past year.

The Council having dismissed, immediately after the second quarterly audit, the then Accountant-Clerk, the Auditors recommended that in future the Accounts should be confided to some Professional Gentleman instead of a Clerk. The Council immediately acquiesced in the proposal, and appointed Mr. Duncan of Tokenhouse Yard, by whom the accompanying balance sheet has been prepared, and from whom the Auditors have received every possible assistance in examining the numerous details of which the Society's Accounts necessarily consist.

The Auditors find that the Society has not entirely escaped the disasters of the preceding year, in addition to which they have to report, that owing to the unfavourable state of the weather, the profits on account of the Exhibitions at the Garden have proved to be diminished to the extent of £748 15*s.* 3*d.*

Nevertheless, in consequence of the economy practised by the Council in cutting down all expenses which were not indispensable to the maintenance of efficiency in the management, the debt of the Society proves to have been reduced upon the whole by the sum of £669 17*s.* 1*d.*

The Account shows a diminution in the amount received for Admission Fees, Compositions, Transactions sold, charges to Fellows for packing plants and for Garden Exhibitions; and an increase of the revenue arising from Annual Subscriptions, the sale of the Society's Journal, Rent of Apartments in Regent Street, Garden Produce, and miscellaneous receipts.

On the other hand the Expenditure, although increased to the extent of £141 18*s.* 6*d.* by the publication of a new Part of the Transactions, and slightly under a few other heads, has been diminished as respects the following items, viz., Repairs of House in Regent Street, Housekeeping expenses in Regent Street, Salaries, Printing and Stationery, Foreign Missions, Miscellaneous expenses in Regent Street, Garden Implements, Mould, Manure, &c., Labour, Garden Repairs, and extraordinary Law expenses, the diminution amounting in the whole to £727 4*s.* 2*d.*

In this manner the diminished income has been counterbalanced, and the reduction in debt to the amount above alluded to of £669 17*s.* 1*d.* has been

effected. This reduction would have been larger by the sum of £141 18*s.* 6*d.*, had it not become necessary to complete the Society's Transactions by the publication of a final number.

The Auditors have much satisfaction in reporting that the Council have resolved that all Life Subscriptions (or Compositions) should henceforth be funded. and that the whole amount received under this head in the present year has been invested in the Three per Cent. Consols Stock.

In reporting upon the assets of the Society the Auditors have assumed that, after the careful inquiry into the arrears of Fellows which they learn that the Finance Committee have instituted, they may regard all sums not considered doubtful by the Committee to be good, and that the whole of the Subscriptions now due for the past year would be recoverable in case of need. They have not felt themselves in a position to form any opinion of the value of the house in Regent Street, of the Library and Furniture there, or of the Garden effects. In fact this part of the Society's property has never, as far as the Auditors are aware, been made the subject of an exact valuation, without which it is impossible to form a correct estimate. The Auditors, however, find that a Committee of Accounts made a report to the Society upon this subject in April 1831, in which report the Society appears to have acquiesced. They have, therefore, taken the value of the House, Library, and Garden, as they find it stated in that document, believing that the large sums since expended in improving this property are an ample set off against the deterioration of time, without however offering any opinion as to whether the property alluded to possesses the value assigned to it.

Proceeding upon this evidence, the Auditors are of opinion that the present financial position of the Society is as follows.

ASSETS.—1. *Items, the value of which was estimated by the Committee of Accounts in 1831, and then admitted to be correct.*

Lease of the House in Regent Street	£4500	0	0
Library, &c. there	1500	0	0
Furniture there	400	0	0
Effects at the Garden and Lease of the Garden	15,000	0	0
	21,400	0	0

2. *Items, the value of which is estimated by the present Auditors.*

Estimated value of stock of Transactions, Journals, Fruit Catalogues, Copper-plates, Wood-blocks, &c.	£1058	0	0
Amount of unpaid Subscriptions due May 1, 1847, supposed to be good	845	10	0
Amount of unpaid Subscriptions for the past year now due	3042	18	0
Miscellaneous Assets, consisting of Rent due, unpaid dividends, and sums due for Transactions sold	98	12	4
Cash in hand, and invested in the funds	796	15	3
	27,241	15	7

LIABILITIES.

Floating Debt as per Balance Sheet	£1807	7	9
Loan Notes	7600	0	0
	£9407	7	9

From this it appears evident that the present assets of the Society are amply sufficient to cover its liabilities and to leave a large surplus.

21, REGENT STREET, 13th April, 1848.

GEO. BAIN,
HENRY GROOM,
W. W. SALMON.

ABSTRACT of RECEIPTS and PAYMENTS, &c. between the 1st of April, 1847, and 31st of March, 1848.

RECEIPTS.

RECEIPTS.			£. s. d.
To admission fees from Fellows, 41 at 6 Guineas each			258 6 0
To compositions for life from ditto, 5 at 40 Guineas each			210 0 0
To subscriptions received from ditto			3237 1 6
To amount of Transactions and Fruit Catalogue sold			28 6 2
Ditto Quarterly Journal ditto			75 17 6
To rent of apartments let off in Regent Street			150 0 0
To garden produce sold			29 2 10
To charges to Fellows for packing plants, &c.			49 12 9
To miscellaneous receipts			23 3 5
To profit on purchase and sale of 1400*l*. Exchequer Bills			42 13 6
To Garden Exhibitions, 1847—			
Received for Tickets issued		£4484 1 6	
Deduct:			
Cost of Medals awarded	£1262 0 0		
General Expenses of the Exhibitions	1488 18 1		
		2750 18 1	
			1733 3 5
To Garden Exhibitions, 1848—			
Received for tickets issued		150 6 6	
Deduct preliminary expenses paid		34 5 3	
			116 1 3
			5953 8 4
To Balance at Banker's, April 1, 1847		124 19 0	
To ditto in hands of Vice-Secretary ditto		13 3 9	
			138 2 9
			6091 11 1

PAYMENTS AND LIABILITIES.

PAYMENTS AND LIABILITIES.		Payments. £. s. d.	Liabilities. £. s. d
By rents, rates, taxes, &c. Regent Street and Chiswick		194 9 9	488 5 3
By repairs, &c., of house in Regent Street		35 2 6	8 0 0
By housekeeping expenses, Regent Street		40 14 8	
By salaries, collector's poundage, &c.		945 19 4	189 9 8
By interest on loan notes	£304 0 0		
Less Property Tax	8 17 4		
		295 2 8	
By cost of Publishing Transactions		61 9 6	105 6 9
By cost of Publishing Quarterly Journal		470 1 7	34 10 0
By library charges, for books, binding, &c.		22 13 9	1 10 0
By printing and stationery		60 15 2	5 16 6
By medals and rewards at Ordinary Meetings in Regent-st.		32 10 0	49 0 0
By cost of foreign missions and importations		49 2 3	100 0 0
By expenses of meetings, postage, &c.		137 6 6	
By miscellaneous expenses in Regent Street		20 3 4	
By ditto at the Garden for seeds, plants, &c.		217 5 2	34 2 3
By implements, mats, &c.		72 14 7	6 2 3
By garden tan, dung, mould, &c.		45 9 3	
By expenses of Distribution department		154 16 9	78 10 1
By garden current labour		1015 11 3	
By coals and coke for Garden		177 18 0	32 0 0
By sundry repairs at Garden		93 16 1	13 17 9
		4143 2 1	1146 10 6
By Debt on open accounts due April 1, 1847	£1818 12 4		
Less discount, &c. upon payments	6 1 4		
	£1812 11 0	1151 13 9	660 17 3
		5294 15 10	1807 7 9
By Cost of 248*l*. 10*s*. 5*d*. 3 per Cent. Consols invested with Compositions for Life received per contra		210 0 0	
By Balance at Banker's	£570 12 7		
By ditto in hands of Vice-Secretary	16 2 8	586 15 3	
		6091 11 1	

April 13, 1848.

This account has been examined, and being compared with the Vouchers found correct.

GEO. BAIN.
H. GROOM.
W. W. SALMON.

			£. s. d.
Amount of Debt 1 April, 1847 . . .			9418 12 4
Less Cash balance			138 2 9
Amount of Debt 1 April, 1848, viz.:			9280 9 7
Liabilities as above . .		£1807 7 9	
Debt on loan notes . .		7600 0 0	
		£9407 7 9	
Less Cash balance 1 April, 1848 .	£586 15 3		
Ditto invested in Stock . .	210 0 0		
		796 15 3	
			8610 12 6
Reduction in Debt since 1 April, 1847		£	669 17 1

A. Duncan, *Accountant*, 10, Tokenhouse Yard.

APPENDIX B.

Report from the Garden Committee to the Council, Dated April 3, 1848.

The Garden Committee have to report for the information of the Council that the general condition of the Garden is satisfactory, the plants in excellent health, and the premises, with the exception of the Old Orchid House, in substantial repair. They, however, regret to state that the large wrought-iron boilers employed in heating the Great Conservatory have become leaky in consequence of rust, and appear to be incapable of repair, and will have to be replaced; at the same time, in order to destroy the dampness of the stoke-hole in which they are placed, it will be necessary to make some alterations in the brickwork.

Some valuable contributions to the collections at the Garden have been received from Mr. Hartweg and the various correspondents of the Society. Among them they would especially point out the following:—

The Shuker Para, or Greengage Apricot of Suædia, has been received from John Barker, Esq., of Suædia, along with a very curious dwarf Apple from Armenia, and the large sweet White Mulberry of Iran, the juice of which is compared to Virgin Honey.

From the Right Honourable Viscount Palmerston various Vine Cuttings from Persia, which, if they can be made to grow, will prove highly interesting. They were in bad condition, owing to free exposure to air in a broken tin case during their journey from Ispahan.

From Captain Munro, through the Earl of Auckland, a young plant of Amherstia nobilis.

From A. W. Powles, Esq., roots of Arracacha, Ocumos, and Yams, eatable roots from the Caraccas.

From C. A. Uhde, Esq., various tubers of Mexican Potatoes.

From Dr. Hermann Wendell, J. R. Neame, Esq., Messrs. Knight and Perry, Mr. Salter of Versailles, and others, a considerable variety of new Fruit-trees.

A variety of useful Plants from G. U. Skinner, Esq., Lieut.-Colonel Sykes, Messrs. Veitch of Exeter, Messrs. Lucombe and Co., Messrs. Low of Clapton, Messrs. Backhouse of York, Mr. Glendinning, Mr. Groom, Messrs. Knight and Perry, Messrs. Hendersons, &c.

All the seeds collected in his last journey into the North-West Interior of New Holland from Lieut.-Colonel Sir Thomas Mitchell.

Various Nepal Seeds from the Honourable Court of Directors of the East India Company.

The most important of these are mentioned in the Journal of the Society as they come into flower or fruit.

In the same place will also be found the result of the experiments carried on in the Gardens, more especially with respect to Potatoes; and a long and valuable series of observations on the temperature of the soil from 1837 to 1847.

The new regulations for the admission of young men into the Garden, reported at the last Anniversary, have been found to work well, and effectually to limit the candidates for admission to the best educated and most intelligent class of young gardeners. The Committee have, however, found it necessary to introduce a rule that no Fellow of the Society shall have more than one person at a time employed in the Garden on his recommendation, and that the age of the men shall not exceed twenty-five when they are received.

Two of the men, John Grey and William Wren, have passed the prescribed examination with credit, and have left the Garden for places.

The influence of the Reading Room over the improvement of the young men is found extremely beneficial. Attendance at it is regular, the conduct there praiseworthy, and the diligence of the men such as to deserve the favourable notice of the Committee, who find that the books most in demand are such as appear to have the most direct relation to the future objects of the men as gardeners.

Twenty-nine evenings have been occupied by Lectures or special instruction since the last Report.

The Committee have to express their acknowledgments to the Rev. F. E. Thompson for his gratuitous assistance in holding three examinations in Arithmetic, and in delivering Five Lectures: two on the properties of numbers, and three on simple mechanical forces.

With the aid of the subscriptions of one guinea each from Mr. Salmon and Mr. Horsman Solly, formerly reported, the men have for five evenings enjoyed the advantage of being instructed in the useful art of making ground-plans, by Mr. Francis Rauch, a gentleman possessing great skill in that department of gardening.

They have also to thank Mr. Nathaniel Lindley for two lectures on Heat and Combustion.

And they have to report that Dr. Lindley has himself delivered fourteen lectures on various subjects connected with gardening, viz.:—One on the Education of Gardeners, ten on the Theory of Horticulture, two on the Diseases of Plants associated with parasitical Fungi, and one on the Habits and Primary Distinctions of Insects. This officer has also endeavoured to encourage the men by giving small prizes of money or books for the most successful competitors in making ground plans, collecting and naming wild plants, arithmetical exercises, and other matters connected with gardening. His prizes for wild plants were increased by the subscription of 1*l.* by W. Hasledine Pepys, Esq.

During the year the resources of the Reading-room have been increased by some small purchases on account of the Society and by the following donations, viz.:—

From J. F. Leathes, Esq., F.H.S.:—
A lithographic drawing of a large Gourd, 196 lbs. in weight.

From Francis Rauch, Esq.:—
A plan of the Public Gardens at Versailles.

A large drawing of a beautifully trained Peach-tree. By M. Alexis Lepère.

From Miss LINDLEY :—

Butler's Sketch of Modern and Ancient Geography. A new edition. 8vo.

Watts's Logic; or, the Right Use of Reason. 12mo. 1807.

And some other works of instruction.

From EDWARD BECK, Esq., F.H.S. :—

A smooth slab of Slate for use during the Lectures in the Reading-room.

From Captain WIDDRINGTON, R.N., F.H.S. :—

Spain and the Spaniards in 1843. 2 vols. 8vo.

From the VICE-SECRETARY :—

Fortune's Three Years' Wanderings in the Northern Provinces of China; including a Visit to the Tea, Silk, and Cotton Countries, &c. 8vo. 1847.

Lindley's Elements of Botany. Fifth edition. 8vo. 1847.

Thomson's Seasons, with Notes by Dr. A. T. Thomson. 12mo. 1847.

The Forester. By James Brown, Forester, Arniston. 12mo. 1847.

Wight's Spicilegium Neilgherrense; or, a Selection of Neilgherry Plants. 4to. Vol. I.

Sir Thomas Mitchell's Journal of an Expedition into the Interior of Tropical Australia, in search of a Route from Sydney to the Gulf of Carpentaria. 8vo. 1848.

The Library now consists of 432 bound volumes, exclusive of pamphlets and unbound periodicals.

The number of visitors to the Garden, exclusive of the days of exhibition, has been 6380—a smaller number than usual, in consequence of the exclusion of visitors by tickets on the days preceding the Exhibitions.

The distribution of plants, packets of seeds, and parcels of cuttings from the Garden has been as follows :—

1847–48.	Plants.	Seeds.	Cuttings.
To Members	6,071	44,041	3,085
To Foreign Countries, Correspondents, &c.	1,256	6,848	350
To Her Majesty's Colonies	116	519	86
Total	7,443	51,408	3,521

A number exceeding that of 1846 by 73 plants, 1580 packets of seeds, and 939 parcels of cuttings. The Garden Committee have directed Mr. Munro, in making this distribution, to keep in view as far as possible the principle of not propagating plants that are readily procurable in the nurseries, and also that applications are to be complied with according to the order in which they are made. The Committee cannot, however, authorize the distribution of plants without any application whatever being made; and they are anxious to impress upon the minds of the Fellows of the Society, especially of those residing in the country, that if they do not make known their wishes for plants, it is not in the power of the Committee to supply their wants.

In this Report the Committee have forborne from proposing to the Council the execution of any new works in the Garden. But they think it desirable that it should be understood that a new Orchidaceous House has become indispensable, in consequence of the decayed state of the stove now occupied by Epiphytes, as has been already mentioned. The collection of plants of this class is now so extensive and valuable as to demand better and more extensive accommodation.

W. H. PEPYS, *Chairman.*

APPENDIX C.

REPORT from the GARDEN COMMITTEE to the COUNCIL,
Dated Sept. 6, 1847.

THE Council having requested the Garden Committee to state whether they can suggest any mode by which the produce of the Garden can be made more available to the funds of the Society,

The Committee have to report, that the present method of disposing of the surplus produce of the Garden is—

1. By sales to Fellows at the market-price in Covent Garden.
2. By sales in Covent Garden, on which an allowance of 12½ per cent. is made to the salesman, who for this profit finds baskets and carriage. These sales are effected whenever there is a sufficient quantity of produce ready to make it worth the salesman's while to take it.

From these two sources the money which is carried to account is derived.

The Committee are not aware of any better mode than this of disposing of the surplus produce, concerning the amount of which very erroneous ideas are entertained.

The produce of the Garden is applied to various purposes besides that of sale:—

1. The meetings are supplied.
2. All Fellows who visit the Garden are allowed to taste fruit, for their information.
3. All those Fellows of the Society who may be desirous of determining the names and qualities of Fruits are supplied with specimens of such varieties as the Garden of the Society produces, on application to the Secretary. Not more than two specimens of any sort are sent, and the expense of the package and carriage is charged to the Fellows making application for them. If a second supply of the same fruits should be required, it is not, however, furnished gratuitously.*
4. Much fruit is consumed in extracting its seeds for exportation to foreign countries.

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* The quantity of fruit thus supplied has been as follows:—

	Pears.	Apples.
In the season of 1842	79 dozens	60 dozens
Do. " 1843	34 "	19 "
Do. " 1844	50 "	44 "
Do. " 1845	24 "	34 "
Do. " 1846	32 "	30 "
Do. " 1847	68 "	61 "

The above were sent out, named, in specimens of two of a sort.

ROBERT THOMPSON.

5. Some is necessarily wasted by being allowed to hang upon the trees, or to remain upon the shelves of the Fruit Room, for inspection, till it is unfit for sale.
6. Some fruit is grown for the purpose of obtaining seeds for distribution.
7. A portion is consumed in supplying the tables of the Officers of the Garden.

When these deductions are made, the produce of the Garden must necessarily be much diminished, even in years when the crops are abundant.

But there are other reasons why the produce is unproductive of pecuniary profit:—

1. A large number of the Fruit Trees in the Garden are unsuited to the London market, and their produce, if saleable at all, can only realize the lowest price—such are Cider and Perry Pears, and all those varieties of fruit which are necessarily retained in the Society's Collection, because, although they may not be of value in the climate of London, they are important in other parts of the kingdom.
2. From the great variety of kinds of fruit cultivated in the Garden it arises that only a very small quantity of each kind is ready for sale at the same time. This is not worth the attention of a salesman; and the expense of sending such small parcels to London would be greater than they are worth, even if it consisted with the character of the Society to enter into petty sales.
3. The inferiority of *appearance* in the produce of the Garden, owing to the market-garden system not being adopted, is in the case of Strawberries such as to render the produce scarcely saleable at any price; so that when the labour of gathering and the cost of baskets and conveyance are deducted, the net return is smaller than the expense. For this reason the Garden Committee found it necessary, several years ago, to order the market sale of Strawberries to be discontinued, and the fruit to be left to be gathered by visitors.

These are general facts, affecting the results of all seasons, whether past or future. In the year 1846, the money-produce of which was unusually small, other causes came into operation unfavourably. The *peach wall* having been entirely replanted, no fruit whatever was obtained from it; nor can it produce any for the present. The crop of fruit of all kinds near London was almost destroyed by the late spring frosts, and the Society's garden suffered in proportion. In addition to this the fruit-room was broken open by thieves on the 25th of October, 1846, when a large quantity of the finest fruit was carried off.

The only great remedy for the unproductiveness of the garden in money is to change its whole system; to abolish all the privileges which at present exist; to sell everything as soon as it is marketable; to stop experiments, and substitute market-garden cropping and cultivation; and finally, to exclude from the garden everything which is not well suited for sale. If this were done, the garden of the Society might perhaps become as productive of revenue as the same number of acres of land in its neighbourhood, at an expenditure considerably larger than at present.

But in the opinion of the Committee this measure would be unjust to the Fellows of the Society, whose privileges would be invaded, inconsistent with the purposes for which the garden was instituted, and wholly destructive of the reputation of the Society, if not fatal to the Charter.

The Society was established for the improvement of horticulture in all its branches; its garden was formed and is intended for experimental purposes; the funds of the Society are subscribed in order that these purposes may be

carried out; and if the garden is converted from one of experiment into one of cultivation for mere profit (and it must be either one or the other), the intention of its founders will be defeated.

These considerations explain why a proposition, that "tenders for the entire produce of the garden should be annually advertised for," could not be entertained by the Committee. An indispensable condition in such an arrangement would be that the contractor should have full control over the crops, removing them when and how he thought fit, and restraining the Fellows of the Society from the enjoyment of the privileges secured to them by the bye-laws. In the absence of such a stipulation no tender could be made, or, if made, the sum that could be offered would necessarily be less than can be obtained by the present arrangements.

Although the Committee are not able to advise any essential change in the present mode of disposing of the produce of the garden, yet they are of opinion that an improvement would be effected in the detail, if, in all cases (with the exception of pears), as soon as a crop is ready for gathering, the reserve which is necessary for the purposes of the garden were at once made, and the residue sold for what it will fetch—Pears to be sold only as soon as they become marketable. Thus, as soon as a crop of peaches, grapes, &c. was ready for gathering, it would be at once sent to market, with the exception of so much as is required for exhibiting the variety, or supplying the customary demands. The Committee, however, in making this suggestion, do not anticipate much advantage, if any, in a pecuniary point of view; but they offer it for the purpose of satisfying those who erroneously imagine that the produce of the garden is wasted.

R. H. Solly, *Chairman.*

6th September, 1847.

ORIGINAL COMMUNICATIONS.

XXII.—*On the Caprification of the Fig.* By Professor Gasparrini.

[Translated from the Italian.]

The Royal Academy of Sciences of Naples proposed as the subject of an Essay—

1. To examine the opinions of authors on caprification, above all those of Cavolini and Gallesio, and to see what were the merits of the ideas and experiments of these men.

2. To describe the varieties of figs, those especially on which caprification is practised.

3. To prove by experiment or on anatomical or physiological grounds whether the fertilisation of the seeds is effected by the insect of the caprifig, or whether the insect produces no such effect and caprification be useless.

4. The Essay was to be accompanied by figures representing the varieties of fig on which the experiments are made, and the structure of their organs of fecundation and fructification.

Gasparrini's memoir in reply is divided into four parts. The first contains a detailed physiological account of the caprifig and its different varieties, which he considers not only specifically but generically distinct from the cultivated fig; including a detailed history of the fly bred in its fruits.

The second is a similar account of the eatable figs cultivated about Naples.

The third here translated relates specially to caprification.

The fourth is a botanical comparison of the fig, the caprifig, and some exotic species.

§ 1. *Historical Notes on the Subject.*—Herodotus informs us in his histories that the Babylonians knew of old that there were male and female date-trees, and that the female required the concurrence of the male to become fertile. This fact was also known to the Egyptians, to the Phenicians, and to other nations of Asia and Africa. The ancients were acquainted, moreover, with several circumstances proved by experience relative to the diversity of sexes in plants like the one just mentioned of the date-tree, and among these diœcious plants they distinguished the female as being the one that bore fruit. And in other cases where they suspected a diversity of sexes, not having any fixed rule or sufficient science to guide them, they judged merely by external *facies*, by medicinal virtues, or by other such fallacious or slight indications. If it may not indeed at all times have been universally believed that all things endowed with senses or

life are reproduced by the concurrence of sexes, yet the ancients, although they could not detect either the sexual organs of plants or the fact of their fecundation, nevertheless seeing them at certain periods of their life clothed with elegant flowers perfumed with various essences, distilling delicious nectars, all radiant with glory, as if prepared for some ceremony of proportionate importance, they judged by the rules of common sense and analogy that this was the period of their loves, and that there must be amongst them all, according to the laws of nature, a male and a female. Thus with regard to the date-tree, the Babylonians, either imagining or finding by experience that the great distance of the male was often an impediment to the fecundity of the female, they suspended to the latter male flowers brought from a distance; and they believed that the fertilising power of these male flowers resided in the small flies which they harboured, and which, introducing themselves into the female flowers, caused them to set and to ripen. This operation, called *palmification*, is still in use, and reckoned necessary for obtaining fruit in the countries where the date-tree grows naturally. If we could establish with certainty that this theory of the date-tree was current before the facts were known concerning the fig, we might well suppose that the earliest Greek cultivators, seeing the *caprifig* always sterile (in so far as that the fruit does not become sweet) with a coarse and wild habit, and seeing the quantity of little flies it produces, should have thought that that was indeed the male, and that the fertility of the real fig depended upon it, and that thus taking example from the date-tree the custom should have originated of suspending the flowers of the *caprifig* to the domestic fig-tree. But the memory of this custom is even more ancient than that of the palmification of the date-tree. This *caprification*, as it is called by us, is spoken of by the most ancient Greek writers on natural history; it is alluded to by Aristotle, and minutely described by Theophrastus, writers who were not only superior to all others in their philosophical speculations, but were very ingenious in their ideas on natural objects and phenomena.

Aristotle observes that a certain insect is generated in the flowers of the *caprifig*, which having become a fly, enters the unripe fruits of the domestic fig and causes them to set, for which reason cultivators always plant the one by the side of the other, or suspend the fruits of the one to the branches of the other. Theophrastus does not confine himself to this bare statement of the practice which prevailed, but discourses at length on the manner in which the little fly could produce this effect, whether by opening or by closing the aperture of the fig. He rejects the second theory and pronounces for the first, saying that the fly by continual nibbling enlarges the mouth of the

fig and sucks out the superfluous humours; and that the air penetrating through the aperture, it follows that by its warmth and fermenting qualities the fig sets and ripens. Nevertheless that there are races of domestic figs which do not require the aid of the caprifig to ripen; and treating of these, this diligent observer is of opinion that that may arise from the quality of the soil or of climate as well as from the particular nature of certain figs which can ripen their fruits without assistance. He believes that a poor dry soil with a northern aspect, the deficiency of moisture in such a soil, the cool wind which is usual in such a situation, and even the dust which would cover the fruit and absorb its superfluous humours, would all tend to open the mouth of the fig and produce the same effects which in the other case are brought about by the flies; and that if in Italy and some other countries caprification was not known, it was because, for the above reasons, the figs in those countries set and ripened naturally: and Pliny, speaking of this subject, says that the caprifig is of a wild nature and does not ripen its fruit, but that it imparts to the fig that virtue which it does not itself possess, for such is the course of Nature, that even from putrefaction something should be generated. It produces midges which, deprived of any nourishment from their own parent, fly to the allied fig, and by continual biting at the mouth enlarge it, and, penetrating withinside, facilitate the admission of light and fertilising air (*aura cerealis*), thus transforming the milky humour into a sweet honeyed juice. On this account the caprifig should be planted near the fig, and on that side from whence the wind might carry the fertilising breath. Now this description is but little more than a copy of what Theophrastus had written so long before. These were the opinions of the learned as well as the usages of the country in the times of Herodotus, Aristotle, Theophrastus, Dioscorides, and Pliny; but however ancient was the practice in Greece, it remained there; for there is no tradition of its having ever been introduced into Syria or Palestine: and Pliny remarks that even at his time it was only in use in the islands of the Archipelago. It may, therefore, be affirmed with tolerable certainty that it was only brought from thence into our country (Italy), although, owing to the long rule of barbarians, it is impossible to fix the period of its introduction with any degree of probability.

After the revival of science, Cæsalpinius, about the year 1583, discovered the sexual organs in flowering plants, and thus the conjectures of the ancients became a certainty. Nevertheless the opinions on the effects of caprification did not change in the least, and none of the botanists or agriculturists of the time, who treated of the fig, differed in this respect from Theophrastus, as

may be seen in the works of Bauhin, who lived many years after Cæsalpinius. In the beginning of the last century, Tournefort, travelling through Greece, endeavoured to ascertain the details and the effects of caprification, and whatever he saw and noted down he afterwards published. He follows the opinion of the Greeks with regard to the manner in which the effects may be produced, saying that the caprifig produces three kinds of receptacles (as we have elsewhere explained in detail) and three generations of the fly in the course of the year; that there are eatable figs which require the assistance of the caprifig to set; that the virtue of caprification consists in the bite of the insect, which by enabling the superfluous milky juice to escape, causes the fig to set and ripen, and perhaps also some liquid issuing from the fly itself produces the saccharine fermentation by combination with the juice of the fig. Pontedera afterwards, in making known the structure of the flowers, as well of the caprifig as of the fig, states his belief that the fly acts upon the latter by giving admission into it to light and air. All which statements differ in little or nothing from the opinions of the Greeks.

Meanwhile the discovery of Cæsalpinius, in the commencement of the preceding century, had more than ever attracted the attention of the learned, many of whom admitted the necessity of sexes for the fecundation of fruits, and especially for the purpose of obtaining fertile seeds, yet there were not wanting those who contradicted it, and amongst other grounds adduced the fig as ripening its fruit without fecundation. But the most sensible observers multiplied the facts relating to the fecundation of vegetables; they ascertained that the female date was enabled to set and ripen its fruit, not by the insect, as Herodotus believed, but by the fertilising powder of the anthers; and, amongst other remarkable circumstances, this also was discovered, that certain animals and vegetables lived under a kind of mutual dependence for the accomplishment of the operation. Thus, for example, it was observed that the male flowers of the gourd abounded in pollen, which is their fertilising powder. With this pollen bees chiefly form their wax, and the bee flying from flower to flower carries it from the male to the female flower, which eagerly sucks it up, becomes fertile, and grows into the fruit. These facts and other similar ones having been related and proved, it appeared to the learned, and especially to Linnæus, that they explained the whole secret of caprification. This great botanist well knew that the fruit is the enlarged ovary, and that the fig commonly called a fruit is not the ovary, but a receptacle containing the flowers, and capable of enlarging without the assistance of fecundation. Knowing, moreover, by the researches of Pontedera that the domestic fig only contained female

flowers, and that the males were in the caprifig, and that in the one as in the other the flowers remained enclosed withinside the receptacle, he conceived the beautiful idea that the fecundation of the fig took place by a special provision of nature. This consisted in the creation in the caprifig of an insect which, for the purposes of support and propagation, was obliged to penetrate into the domestic fig, and carried with it the prolific humours; thus fertilised, the embryo was produced, and the greatest number of the receptacles remained on the trees and came to maturity. In reply to those who followed the opinion of Camerarius, who said that the seeds of the fig never germinated, as well as to those who alleged on the contrary that fig-trees could be only raised from the seeds of figs of the Greek Archipelago or of Italy, with the remark that the statement of Camerarius was correct in regard to seeds produced in Germany, France, or England, where, there being no caprifig, the figs remained necessarily sterile; whilst, on the contrary, in Greece and Italy, where the caprifig existed, the fig-seeds became fertile, either naturally or artificially by means of caprification—this explanation* appeared so just and natural, that it was generally adopted.

§ 2. *Concise Exposition of the Theory of Carolini.*—Towards the close of last century Cavolini, who was in natural sciences the pride and ornament, not only of this our city (Naples), but even of the whole of Italy, sent to press a learned treatise on the present subject. He first describes the caprifig and the fig, then observes that they are but individuals of one species, the caprifig being androgynous, and the fig the female plant; and he proceeds to endeavour to prove the necessity of caprification. The fig, he says, is a receptacle, or "a portion of the branch prolonged for the purpose of fructification, and not a pericarp, which is the external covering of the seed; the receptacle can support itself and attain its perfection without fecundation, but not so the pericarp, on account of its adherence to the seed by means of its vessels." Nevertheless he afterwards declares, that this theory is not in all cases confirmed by fact, alleging that the receptacle of the strawberry, of the mulberry, of the blackberry, and other plants, does not grow or become succulent till after the fecundation of the pistil. And from these data he argues, as to the mode in which caprification works, as follows: that which is commonly called the fruit, is a dilatation of the branch, and bears the flowers; but being different from the real branch in internal structure, the nutritive fluids meet with difficulties in passing from the large direct channels of the branch

* See Hegard's 'Historia Naturalis et Medica Ficus,' Upsal, 1744, in Linn. Amœn. Acad.

into the vessels of the receptacle, which are of a different structure and direction. On this account they would soon drop off if the female flowers were not fertilized; but, as the fecundation induces an affluence of humours to the ovary, and thence to the receptacle, it follows that the one and the other continue to grow. And as this defective structure is greater or less in different sorts of figs, so (extrinsic) fecundation is necessary in some, superfluous in others, whilst others only require a very little of it. And if the same fig at Naples, for example, may require caprification, and not require it at Capri, it is because, in the latter place, the soil, reduced to the finest dust, and the air, loaded the one with alkaline salts, the other with phlogiston, could produce the same effect; that is, the setting and ripening of a large quantity of fruits. Thus it is that in certain places caprification is entirely unknown, as in the promontory of Sorrentum, Ischia, and other districts. Believing, therefore, that fecundation was necessary to sustain the domestic fig till its maturity, and that it contained only female flowers, whilst those of the caprifig were androgynous, with perfect anthers, it followed naturally that the fly coming from the one to enter the other should carry with it the pollen or the fertilizing essence. He, consequently, thought it worth while minutely to describe the insect in its various states. Such is, in brief, Cavolini's theory of caprification, which we should have given in detail did it not appear to us to be too prolix and somewhat obscure.

§ 3. *Exposition of the Theory of Gallesio.*—Gallesio, not long dead, has left a large treatise on the physiology of the fig and on caprification. We have extracted from it in their proper places whatever appeared to us of the most importance on the fig and on the caprifig, and we now proceed to state this author's opinion on caprification. He admits with Theophrastus, Pliny, and so many others, that there are figs which mature their fruits naturally, and others that require caprification. This difference was attributed by the ancients to climate and soil, believing that in a poor soil, with a northern exposure, the fig could nourish and mature its fruit without the caprifig; Gallesio, on the contrary, affirms that it proceeds from a difference in organisation, that the fig requiring the caprifig is quite a different kind from the others, and that both preserve their character and temperament in any soil or climate which they can bear. Now the diversity in their organisation, according to him, is this. Some figs have no flowers capable of being fertilised, as their ovaries are without ovules; these produce no fertile seeds, and cannot feel the action of the caprifig, which they do not stand in need of to preserve and ripen their fruit. These he calls *mules*, and says it is they which are cultivated in

Spain, France, and Upper Italy. Other figs, called *semi-mules*, have flowers susceptible of fecundation, the ovaries being furnished with ovules. In these fecundation generates the embryo, which causes the nutritive humours to flow to it from the peduncles, which can only draw them from the receptacle; this, again, cannot obtain the nutriment from anywhere but from the stem, and thus the fecundation occasions the setting and ripening of the fruit. And as it is only the caprifig that can produce this effect, so caprification is necessary for the perfection of these semi-mule figs. Such are, he says, the figs of the Archipelago, and many of those of the kingdom of Naples, all producing female flowers only.

§ 4. *Opinions against Caprification.*—There are many who will not admit that any effect is produced by caprification, and these are chiefly ignorant or simple cultivators, who judge from observing that in many places figs ripen without the co-operation of the caprifig. But with these must not be confounded two distinguished French naturalists, Olivier and Bory de St. Vincent, who have enounced the same opinion. The former, after having explained the process as practised in Greece, adds:—"This operation, of which some authors, both ancient and modern, have spoken with admiration, appears to me to be nothing more than a tribute of ignorance, which man pays to prejudice. Caprification is unknown in many parts of the Levant, in Italy, in France, and in Spain, and begins to be abandoned in some islands of the Archipelago where it used to be practised, and which nevertheless still produce figs excellent for eating. If the operation were necessary, whether fecundation be effected by the fertilising pollen dispersed in the air, introducing itself into the mouth of the fig, or whether nature make use of a little fly to transmit it from one fig to another, as is commonly believed, it is evident that the first figs in flower could not fecundate at the same time those which have already attained a certain size, and those which are only just appearing, in order to ripen two months later." I do not transcribe the words of Bory, for his narration appears to me to be but a judicious illustration of what Olivier had stated.

And here I close the history with the following brief recapitulation of the different opinions of authors on the mode of operating of caprification. The ancients believed that its virtue depended on the fly of the caprifig, which, by forcing its way into the domestic fig, facilitated the entrance of light and some fertilising or fermenting vapour, and enabled the fig to set and ripen; and that a poor soil and northern exposure produced the same effect. Tournefort believed that the insect made the figs set and ripen by pricking and biting them, giving an issue to the

superfluous juices, and perhaps by communicating some peculiar humours of their own produced the saccharine maturation. Pontedera followed the ancients, whose theories were all based on that of Theophrastus. Linnæus concluded, from the observations of Pontedera on the structure of the flowers of the caprifig and the fig, that the latter could not be fecundated without the assistance of the caprifig, and that this fecundation enabled them to set more abundantly. Cavolini combined in some measure the theories of Linnæus and of Theophrastus, affirming that the caprifig fecundates the fig, and thereby causes it to bear more fruits and ripen them better; but that the same fig can also ripen its fruit in certain districts by the sole effect of soil and climate. Gallesio follows Cavolini in as far as regards the action and effects of fecundation, but believes that neither climate nor soil can produce anything of the kind; and that the figs which do not require caprification differ from the others in the internal structure of their flowers. Lastly, the opinion of our cultivators is nearly that of the Greeks. They believe that the caprifig is necessary for some figs, which, without it, would lose the whole or the greater part of their fruits whilst still sour, and that it hastens the maturity even of those figs which do not absolutely require it. They also admit that the quality of the soil and climate may also in some cases produce the same effect as caprification.

§ 5. *Discussion of the above Opinions.*—The ancient philosophers and naturalists admitted, as every one knows, four elements—earth, water, air, and fire—the which combined together in various ways produced an infinity of phenomena and things. Now Theophrastus, wishing to explain how it could happen that the fly should cause the young figs to remain on the tree, bethought himself that, whilst the fig abounded in humidity, it was deficient in the air and heat necessary for fermentation, and that the insect, by feeding, carried off precisely the superabundant humidity, and by opening the mouth gave entrance to air and heat; and as this happened naturally in a poor soil and northern exposure, there was no occasion for the assistance of the fly. But in the present state of science, who would believe in the attribution of such powers to the soil and the north wind? On the contrary, such circumstances would rather produce an opposite effect; for the want of humidity and cold tend rather to contract the parts. And if any one were to see in the *aura cerealis* of Pliny that which is now called pollen, or the fertilising dust generated in the anthers, would probably be mistaken, for it appears to me that the epithet *cerealis* denotes nothing but fertility or abundance produced by the *aura*. The opinion of Linnæus has, in truth, all the appearance, I do not say of pro-

bability, but even of certainty, being simple and analogous to what takes place in a great number of vegetables. And that of Tournefort, if one does not entirely give faith to it, has nevertheless much of probability, considering that in other fruit-trees the ovary, being pierced by an insect for the purpose of depositing its eggs, does not fall off on that account, but ripens like the others, only a little earlier. Cavolini's theory is derived directly from Linnæus, only that his explanation of the manner in which fecundation makes the fruit of the fig set is ingenious, and even rational. Admitting then, for the moment, that the fact is as stated by that celebrated naturalist, that is to say, that in certain figs the nutritive juices cannot pass readily from the branch to the fruit (on account, as he says, of the extreme tenuity and curvature of the vessels), unless attracted by the embryo generated by fecundation; yet he has not shown that in the figs which ripen without caprification these vessels are really less curved or larger. Now we have proved that the structure of the receptacle in all the varieties of fig is tolerably similar. And his observation that the fine dust of the soil might produce fecundation is now wholly inadmissible. For although towards the close of last century there were some who believed they had obtained perfect seeds furnished with embryos, by fecundating the pistil with very fine charcoal dust, later experience has entirely disproved it. As for the virtue attributed by authors to the alkaline salts of the earth, or the phlogiston of the air, as being capable of producing the same effect, it can now no longer be supported without offending the dignity and grandeur of science. Gallesio's opinion is essentially that of Linnæus, as to the importance and the action of fecundation; and he follows Cavolini in admitting that certain figs require caprification and others do not, for the ripening their fruits. But he does not see the cause of this diversity either in soil or climate, but in their different organization, believing that those figs only which have their flowers apt for fecundation require the caprifig, as well to produce the embryo as to ripen the fruit. Nothing farther can be deduced from Gallesio's work, in which, to my mind, there is great confusion, owing partly to pre-conceived and ill-defined ideas, such as that of the distinction between *mule* and *semi-mule* varieties, partly from the author not having precisely stated in what consists the diversity of structure on which he founds his theory, and, above all, from this, that he never himself saw the operation of caprification, nor examined the variety of fig on which it is performed. Moreover, his own theory, which we have perhaps stated more clearly than he does himself, appears to be in contradiction with itself in the two principal points. For if, in the variety called by him *semi-mule*, the sap of the branch

passes into the receptacle attracted by the action of fecundation and the vital power of the embryo, how is it that in the other variety the same cause does not produce the same effect? And here let us repeat, that the different receptacles of the same tree, of whatever sort the fig may be, do not differ from each other in the least in the organisation of the vessels, the parenchyma, and the fibres.

Such are the ideas of authors on caprification. Were we certain that Theophrastus and Pliny had intended by the word *aura* to denote the pollen, all would have joined in one general idea, that of fecundation. But in the history of the different opinions, as given above, one remarkable fact is included, which may not appear at first sight, which is, that with all the subtle fancies conceived by authors in their theories and explanations, not one of them has put forward a single experiment; but all, pre-occupied with the certainty of the fact, have aspired at nothing but discovering the reason—even those who had good opportunities of actual observation. And Olivier, in denying to caprification any power whatever, comes to that conclusion, not by experience, but by a just and rational operation of the mind.

But as it appeared to me not only worthy of the labour, but most essential to the consideration of the subject, to ascertain the truth by experiment, I have applied to it all the care in my power. The questions I have chiefly endeavoured to solve are—

§ 1. Does the caprifig fecundate the flower-heads of the domestic fig, and make them remain on the tree in greater numbers?

§ 2. Does the caprifig fecundate the female flowers of autumnal figs, and make them set?

§ 3. Does the caprifig hasten the maturity of the autumnal figs, or of the fruit of any sort of fig?

§ 4. Does the caprifig operate by means of the puncture made by the fly?

§ 5. Does the caprifig operate in any other way than any of the preceding, and by any process as yet unknown?

§ 6. Does the caprifig fecundate the flower-heads of the domestic fig, and cause them to remain on the tree in greater numbers?

The figs near Naples which always produce fruit are chiefly of two kinds, the *Colombro* and the so-called *Paradise* fig. On two middling-sized trees—one of each of these kinds—I suspended towards the end of April some *cratiri* * of the caprifig,

* These are explained in the first part of the memoir, to be those young figs of the caprifig which first appear in September, and remain through the winter till the following spring, when they come into flower.

called by our cultivators *Mamme di propichi*, or *caprifig teats.* The fly entered the flower-heads of the fig, but they did not set in greater numbers on each branch than was the case on similar fig-trees not caprified, and growing far from any caprifig. In the ripe figs I could not find a single seed with an embryo; they were all sterile; some quite empty, others containing albumen only, and when sowed would not germinate.

At Baja the *Dottato* fig almost always ripens its fruit. Whoever passes by that district will readily observe places where the Colombro and the Dottato figs are so close to the caprifig that their branches intermix. Yet there are no signs among them of early maturity, when compared with similar fig-grounds far from any caprifig. These figs naturally do not bring all their fruits to perfection; those that fall are called at Baja *Sbufoni*, and this usually takes place about the end of May or the first half of June.

In these fallen fruits, in the vicinity of the caprifig, there are generally dead flies, and never seeds with embryos. Out of fifty figs recently fallen from a Colombro which I examined on the 17th of June, five only contained no insect; the remainder had them in greater or less numbers, but were so destroyed inside, and black and rotten, owing to the insects which had died in them, that to all appearance that was the cause of their falling. On the same tree were a number of figs looking nearly ripe, but slightly pricked and insipid, and which fell off with a slight shaking of the tree. Some of these contained insects, others did not; the former, like the fallen ones, were destroyed and black inside. As to the permanent or set fruits, which in the middle of June can well be distinguished from the others, there were some with the insect, others without. In the fallen fruits of the Dottato fig I did not find one which had not the fly; but among the permanent ones there were some free from it. These experiments and observations were repeated three consecutive years, whilst every attempt proved vain at making the seeds of these figs germinate, though they were sown under a variety of circumstances and at different seasons. The fly, therefore, which issues from the *cratiri* of the caprifig towards the end of April produces no effect on the domestic fig either in fecundating their female flowers, or in making them remain on the trees, or in hastening their maturity. If in the latter respect a precocity may sometimes be observed, the difference is so slight as not to be taken into account, considering the diversity of aspect, the trees being more or less exposed to the sun. The size of the tree, the being single and uncovered, or choked by the surrounding vegetation, may also occasion some difference, even at very small distances. Indeed the different branches of one and the

same tree ripen their fruits at different times. That the Dottato fig should ripen its fruits at Baja is not to be attributed therefore to the caprifig planted there, but solely to the climate, or perhaps to the soil, for the same variety near Naples will produce nothing, even with the caprifig, and in other localities will do as well as at Baja without it. And on the *Lardaro* fig, which never ripens naturally, at least in the vicinity of Naples, although the fruits enlarge considerably, and some remain on the tree till the end of May, often as I have attached to it the cratiri of the caprifig, I never observed a single one ripen. Therefore I conclude that the remaining and maturing of the figs depends on two circumstances—the intrinsic properties or natural disposition of the variety, and on the quality of the soil and climate.

§ 7. Does caprification hasten the maturity of late figs?

In the district of Portici I made the following experiment. In a large property there were two small trees of the Sarnese fig, distant from each other about two stone-throws, and about equal in size and vigour. To one of them only, about the end of June, I hung the flower-heads of the caprifig, and I counted the fruits upon each tree. In the first days of September there was no difference between them. Each had some ripe figs, some still sour, and others commenced ripening. Counting them again, there was here also no difference, each tree having lost about a fourth part of their fruits. The following year I repeated the experiment, with some modification. I marked with thread or with twine the figs into which I saw the fly had penetrated, and I took care that there was no caprifig in the vicinity of the other tree. The result of this experiment was precisely the same as that of the preceding year. In the mean time I had suspended five flower-heads of the caprifig to a large branch of a Lardaro fig which rose considerably above the rest of the tree, thinking that however little the caprifig might hasten the maturity, the slight difference would nowhere be more perceptible than in the different branches of the same tree. Yet when maturity commenced numerous fruits on all parts of the tree were in the same state as those of the branch in question. Now it appears improbable, not to say impossible, that those five caprifig flower-heads should have furnished insects enough for so great a number of figs.

I repeated the experiments for four years, and always with the same results, though in different localities. At the Camaldoli, where caprification is not practised and the caprifig very rare, I caprified copiously a Dottato fig and two white fig-trees, and none of the three showed the least sign of precocity. I believe, therefore, that the insect does not at all hasten maturity. It must only be observed that maturity is not to be confounded

with a certain early softening which happens to some of the deciduous fruits pierced by the insect. For, as will be seen hereafter, the fly destroys and corrupts the inside of the fig; when it is already disposed to fall it falls the earlier, and by rotting inside becomes soft the sooner.

§ 8. Does caprification cause late figs to set in greater numbers than usual?

The advocates of caprification affirm that in certain varieties it causes all, or the greater number of fruits, to remain on the tree which otherwise would have fallen off. To verify this assertion I have many times made the common experiment which would occur naturally to any one, that of comparing fig-trees of the same variety, to some only of which the caprifig had been brought, in order to observe the difference. Those I have observed with that view are the Lardaro, the Sarnese, the Colombro, and the Sampiero. With regard to the two first, the experiments were made in different localities, especially on the Sarnese, which is very common. None of them showed the slightest effect of the action of the fly, in regard to the quantity of fruit; and if ever any differences were exhibited between the caprified trees and those not acted on by the caprifig, either in favour of or against caprification, they could always, on being well considered, be clearly traceable to other causes (not to speak of soil, climate, vicissitudes of seasons, &c.), as for example, to the age or vigour of the subject, the number of branches, the having been or not enfeebled by a previous superabundant crop, &c. And what I say of the Sarnese may in like manner be said of the Lardaro, with this exception, that being cultivated almost exclusively in the immediate vicinity of the capital, I had no opportunity of observing it in distant localities. Cultivators affirm that this variety more than any other stands in need of caprification, and indeed it loses generally nearly the half of its fruits. But of this variety I will only state two things, not to fall into lengthy repetitions—first, that the caprified trees lose also a great quantity of their figs; and next, that those not caprified ripen many of theirs, with such differences as are occasioned by the above-mentioned causes or others to which I shall presently advert.

The double-bearing figs, such as the Paradiso, the Colombro, and the Sampiero, usually bring many of their early figs to maturity, and but few or none of the late ones; and cultivators affirm that by caprification an abundant second crop may be obtained. Although I had often seen the Colombro ripen many of the late crop without the caprifig, I nevertheless wished to see the results of comparative experiment. Therefore, in the beginning of July, in the neighbourhood of Pianura, I gave the caprifig to several trees of the Colombro fig; amongst them

many had lost all their figs by the middle of August, some retained a few; they had fared like other trees of the same sort not caprified and placed at a considerable distance. Among the fallen fruits some contained the insect, others did not; and it was the same with those that remained on the trees and were advancing towards maturity. Amongst these Colombro figs were several trees of the Sampiero, of which four were caprified. The result was that two of them lost all their figs, both those at the base of the fruit-branches, called *pedagnuoli*, and those of the extremities, called *cimaruoli*. The other two trees scarcely ripened a fourth part, and those chiefly *cimaruoli*, and the fly had penetrated into some of the fallen fruits. It must be noted, moreover, that the above fig-trees were all of the same age, in the same soil, with the same exposure, and all more or less had brought to maturity a good early crop. The same experiment, repeated at Ischia on two trees of the Colombro, produced no result. For if these trees were pretty well loaded, the same thing took place in many other parts of the island without caprification, and not unfrequently in the same places, were fig-trees near to each other, some with and some without fruits, without anything appearing to show a probable reason for such diversity.

§ 9. Does the caprifig, by the assistance of its insect, fecundate the female flowers of the late figs?

As soon as botanists learnt from the observations of Pontedera that the flowers of the different varieties of the domestic fig were always all female, as well in the early as in the late flowers; and as they believed that the caprifig was the male plant, they at once, by common consent, without further observation, concluded that these female flowers could only be fecundated by means of the insect, recognising in this a providence of nature for the accomplishment of that important function. And I myself, having ascertained the correctness of the fact stated, came naturally to the same conclusion, although I had ascertained that the caprifig was not the male of the fig, but a very different plant. But in the course of time doubts gradually suggested themselves to my mind, to remove which I devoted myself to ulterior researches. First, it appeared to me impossible that in all sorts of early figs there should never be a single fertile seed, even when male flowers were present. Yet after repeated examinations I always found such to be the case. This must not excite surprise, however, on considering that the flies which enter these come from the *cratiri* (the young figs of the caprifig that were first formed in the previous autumn), in which are either no male flowers or very few, and those almost always imperfect, and with little or no pollen. And then, if in these early figs I occasionally found a male flower, it was only formed

long after the female flowers, and its anthers never opened, so that any one might conclude that if there were no fertile seeds it was for want of fecundation. What is surprising is the fact that in the late figs the embryo is produced especially in the *peda-gnuoli* (at the base of the branches), and in hot situations, whether the tree be caprified or not. The white fig, the Dottato, and others which the Neapolitans do not caprify, produce abundance of fertile seeds, even in places where caprification is never practised, and where the caprifig itself is rare, as for example at Camaldoli, Ischia, &c. But such observations always leave some doubt whether the insect may not have come from somewhere else, and effected fecundation. In reply to which it must be remembered, in the first place, that this insect, when he issues from his nest, flies with difficulty to any considerable distance; and next, that after he has entered the fig he dies there, and is afterwards to be found either entire or partly decomposed: at the least there remains, as a sign of his having been inside, a brown spot, which easily turns to decay. Now in places where there are no caprifigs, and where caprification is not practised, I have found the seeds perfect in figs which did not show the least sign of the insect having penetrated. Besides, towards the middle of July I impregnated artificially thirty flower-heads on a Lardaro fig, by introducing into the aperture the pollen of the caprifig; one month after ten of them had fallen from the tree without their seeds being fertilized, and the remaining ones did not differ either in size or in the number of fertile seeds they contained from the numerous others of the same tree which had neither been caprified nor artificially impregnated. Not satisfied by all this, I made three consecutive years an experiment which appears to me more important than all the above-mentioned observations. Before any flies began to issue from the caprifig flower-heads, I closed the apertures of some still small figs of the Lardaro and Sarnese varieties with gum arabic mixed with chalk, so as to prevent the insect, should he attempt it, from penetrating withinside; and I took care to add some of the mixture as the figs grew, to keep them well closed. When they attained their full size I opened them; they showed no sign whatever of the fly having penetrated, yet they contained seeds with perfect, well-formed embryos. If this experiment is made upon trees to which the caprifig is afterwards applied, it is a curious thing to see the fly, after issuing from its nest, seek a place to deposit its eggs, and, lighting upon the closed figs, exert itself with all its might to penetrate all round the mouth, trying to force it open where it was only slightly green, and finally, seeing all its endeavours hopeless, turn away from it. This experiment clearly proved that caprification was not neces-

sary to generate the embryo of the fig, though it was not conclusive as to impregnation not being requisite. For it might have happened that some organ or other under some strange form might contain the pollen, and be found on or amongst the female flowers. With this view I examined with the microscope, with all the care in my power, all the internal parts of the fig in every stage from its first appearance to the attaining its full size—the scales under the mouth, the pedicels, the bracts, the perigone, the pistil from the base to the summit—and I never succeeded in discovering anything which contained pollen, or any other analogous substance which might be even suspected of producing impregnation. Only it must be observed that on the style, from its young state till shortly after the changes that take place in the ovulum, or about that time, there appear certain obscure grains which at first sight have some resemblance to those of pollen. On attentive examination they proved to be little glands, with the appearance of wrinkled grains, composed of cellular tissue; and as they first appear so they remain. The same grains appear also in the caprifig and in exotic figs. Besides, it appears that the style has not the tissue for conducting the pollen, unless you would give that name to the internal part of the style, formed of longer and more slender cells than those of the exterior, as may be so frequently observed in lengthened slender organs of numerous dicotyledonous plants. Thus every attempt on my part to discover any need of the fecundating substance of stamens to produce the embryo has failed. And, if I am not mistaken, this is not an isolated fact in the science, Mr. J. Smith having (*Transactions of the Linnean Society*, 1840) already announced that the female of a diœcious plant, indigenous to New Holland, of the family of Euphorbiaceæ, called by him Cœlebogyne, bears in London * fertile seeds without a male flower having ever been discovered on it, and without any suspicion that it could have been impregnated by the pollen of any allied plant; and whoever, in answer to what I have stated of the fig, should allege the assertion of Linnæus, that this tree only produces good fruit where the caprifig grows, must recollect what I have said respecting it, that differences in climate and season more or less hot cause more or less of the seeds to remain empty, and that on that account, in the northern parts of Europe and in stoves, the seeds would probably always remain sterile. So it is with our *Vernino* fig, as to the fruits which it ripens in the open air in November or December, and with that treble-bearing *La Cava* fig, which will sometimes

* At Kew Gardens.

ripen in a room in the depth of winter. On the other hand, the appearance of the summer figs at a time when the flower-heads of the caprifig are in a state of perfection, the insect ready to come out, shows in a manner a *final cause*, which can hardly be anything but fecundation. This consideration has always deterred me from publishing the results of the above-mentioned experiments, and has been the cause of my repeating them so often. What may be really the design of nature in this combination I confess I am ignorant of. Nor do I pretend, with the single example of the fig, to disprove so universal a fact as is the necessity of the concurrence of pollen and impregnation for the generating the seminal embryo, proved by innumerable experiments made by so many distinguished men for a century back. I only state what I have seen in this plant, it being possible that others with a more acute judgment than my own may loosen the knot and discover one of the numerous contrivances by which Nature meets so frequently her wants, when for the fulfilling some particular end she adopts secret and complicated modes, covering herself from our eyes, contrary to her usual custom, with strange and unusual disguises.

§ 10. Does the fly cause the setting and afterwards the early maturity of the fig by the puncture it makes in it?

The ancients believed that the quantity of humour in the fig might be the cause of the late ripening of its fruits, or by suffocating them that of their falling off when still sour, and that whatever diminished the quantity of humour, if it did not cause them to set, at least would aid in that operation. And the celebrated Tournefort was of opinion that the insect produced that effect by piercing or gnawing the mouth or the inside of the fig, so as to draw out the super-abundant fluids. This opinion has been followed by many among the moderns, it appearing to them that the case of the fig should be in every respect compared with what occurs often in pear, apple, and other fruit-trees, in which it is manifest that the blighted fruits ripen some days before the others; and Bernard of Marseilles, a distinguished agriculturist, as I read in Gallesio, is of the same opinion; it appearing to him that what happens from the fly can be proved artificially by pricking the unripe figs with an awl, or even with a straw, and putting a little oil on the puncture. But I think that such ideas and reasonings founded on analogy are worth nothing in the present case; for before coming to the explanation, they ought first to have ascertained whether in fact the fly does or does not hasten the maturity of the fruit, and we have already seen that it does not. Besides, it is not proved yet that the insect pierces the mouth of the fig at all, nor any other part, excepting, perhaps, the ovary in order to deposit its eggs in it;

on the contrary, I believe that it never does; for looking with attention, I have observed it make its way from scale to scale, sometimes unable to overcome the resistance they oppose, nor ever breaking through any of them to clear its way; and these scales examined under the microscope showed no injury from the passage of the insect. But supposing the fly to have pierced, or otherwise injured some scale or other, it does not follow thence that the fig must ripen earlier, when we often see it injured or gnawed away in some places—ants often enlarge the mouth and carry away the scales—and yet these injured fruits either never ripen earlier, or very rarely so, and that from other causes. That puncture and oil hasten the maturity is proved by experiment, but this puncture operates in a different manner, in my opinion, from that which insects make into the ovaries of pears and apples to deposit their eggs. For amongst the pears and apples containing insects' eggs, some, whilst they are growing and still acid, become diseased and fall, others continuing to grow like those that are not touched, become soft when the grub issues from the egg and commences feeding on the pulp; and this pulp is then sometimes, but not always as some believe, of a good flavour. But the fig in the above-mentioned experiment does not ripen from the puncture, but from the oil, as the same effect is produced by putting a little on the mouth of the fig. How it produces that effect on the fig is unknown to me; being put on the mouth it contracts it, then gradually the oil spreads, and wherever it reaches the dark green colour of the epidermis changes to a bright green. I thought I perceived that it did not affect the milky juice in the least, but rather impeded evaporation or other functions of the epidermis, as well in respect of light as of air, and that on that account the anointed fig commenced ripening from the base, and was inferior in flavour to those ripened naturally. But to return to the case of the fly: it neither pierces nor gnaws the substance of the fig, and if it inserts its eggs into the ovary, which I can neither affirm nor deny, it is certain that nothing is born from them; but I am inclined to think that it does not even pierce the ovary, as it does not prevent the formation of the embryo, and the difference between the fig and the caprifig is very great.

§ 11. Action of fruits which are ripe and in a state of decomposition upon those which are young and sour.

In making my experiments on caprification, as I was at a loss to conceive in what manner, visible or concealed, the fly operated, it occurred to me that possibly the caprifig flower-heads suspended to the fig tree and rotting there, might possibly by their close proximity to the sound figs, excite in them some similar alteration which might bring on a premature softening. This

suspicion arose from observing in stores of apples and pears that any rotten ones amongst them readily communicated their decay to the sound. In applying this to our case, I did not intend to put forth any theory on the subject, as the science has not as yet any means of determining what it is that brings on the decay of any particular fruit, nor its effect on others around it: but what cannot be known by direct experiment, may frequently be admitted or presumed by analogy and comparison; and as to the present question, as we have proved that the caprifig does not hasten the maturity of figs, it follows that such a discussion is idle. Nevertheless it may not be wholly useless, I think, to take the opportunity of relating an experiment I made for the purpose of ascertaining what I have alluded to.

Oranges, when they decay, produce mould and emit an offensive smell. On that account, and by reason of their temperature being probably affected during the change, I suspected that decayed oranges might on the tree cause the healthy ones around them to rot; I therefore gathered several oranges with their stalks and laid them by, and as some began to rot I hung them by a bit of twine close to others which were perfectly sound. The experiment lasted about a fortnight, by which time the mouldy orange had dried up; but none of the others, not even a single one, caught the disease, and all remained sound a long time after. It then occurred to me, that if the mould touched the skin of the healthy orange it might produce the decay; I therefore scattered the dust (or otherwise the seeds or spores) of the mould in great quantities on some oranges, and on others I introduced it under the skin, as a contagious disorder is inoculated. But nothing of what might have been predicted happened; the wound, instead of festering, dried up; and in one orange, which after some time began to decay, the rot appeared on the opposite side to that of the wound. From this experiment, I should say, that if oranges when mouldy and exhaling an offensive smell, do not communicate the disease to healthy ones on the tree, and if the mould only propagates on oranges already decaying, is it credible that ripe figs of the caprifig beginning to decompose should produce such an effect on the young domestic figs?

§ 12. Examination of fallen figs.

If the insect has penetrated into the fig it can be known at once by opening it, and sometimes even that is not necessary when the insect is entangled and suffocated amongst the first scales of the mouth, leaving outside its wings and the posterior parts of its body. If, however, it reaches the inside of the fig below the scales, it does not easily decay, but remains nearly entire till the fig begins to show signs of maturity; then it

becomes buried in the swelling and softening florets, and soon decays. But whenever the insect dies immediately the surrounding parts turn brown, and subsequently blacken and rot, even the scales of the mouth, which are harder than the other parts, but especially the stigmata and styles in the cavity, as they project beyond the perigone and bracts, and not unfrequently also the ovary and part of the receptacle. This rarely happens where the insect does not penetrate, and if the style discolours or dries up, it never becomes black or rots. At any rate, experience is a better guide than words, and a single glance of a practised eye will tell with certainty whether the fly has been in the fig or not. Now every variety of fig sheds a certain number of its fruits, some more, some less; and in the opinion of cultivators, the Lardaro, the Chiaja, and the Sarnese would lose all or most of theirs but for caprification. If such were the case, one would naturally conclude that what fruits should fall after caprification would be precisely those in which the fly had not entered. With this view I one year set to examining all the figs that had fallen from the Lardaro, the Chiaja, and the Sarnese, all caprified. On the 29th of July (the fall of the figs commences towards the end of this month and the beginning of the next), I collected under the Sarnese 67 fruits, of which 35 had the insect; three days after 31, of which 24 had the insect; the remainder were black inside, but without any fly—perhaps it had got out again. Afterwards I found 122 fruits with the insect, 141 without. They were of different sizes, *pedagnuoli* which had first appeared in June, and *cimaruoli* of July.

This experiment does not prove, indeed, whether caprification had been of use or not, except that if it had worked as the cultivators believed, we ought at least to have found the largest proportion without the insect, when, on the contrary, those with the insect equalled the others, or surpassed them in number, admitting that the fly had left many. Where I made this experiment I left at a certain distance another Sarnese tree without the caprifig, under which I at several times collected 240 fruits, amongst which 30 contained the insect, which had come from other trees, although at a distance. I wished to compare the number of fallen fruits of the two trees, but I found it almost impossible to ascertain how many fell and how many remained; and where this could be done, the conclusions were fallacious, as it was difficult to find two trees of precisely the same vigour and temperament. Near the one of which I speak was a variety of the other, produced from a seed which had sown itself in the fissure of an old wall, with the fruit rather larger, the peduncle rather longer, the pulp rather finer and whiter.

On the 24th of July I found 14 fruits of the Lardaro with the

insect, and 27 without; on the 30th, under several caprified Lardaro trees, I collected 168 *pedagnuoli* (about an inch long) and a great number of *cimaruoli.* Of the first, 66 with the styles decayed and blackened, contained the insect, 29 had them similarly decayed, but the insect had probably escaped, and 73 without the fly were not altered withinside. Amongst the *cimaruoli,* some had the insect, some not. On the 2nd of August, 55 *pedagnuoli* with the fly, 25 without; and a great many *cimaruoli* as before. On the 9th of August, 48 with the insect, 56 without; on the 17th, about 200 with the insect, and as many without. Thus out of 793 fallen figs of the Lardaro, a little more than half (412) contained the insect, the others (381) did not, and showed no sign of decay or other change.

Of the Chiaja fig, I counted of fallen fruits, *pedagnuoli* and *cimaruoli*—

24 July . . .	136	945 containing the fly.
27 ,, . . .	172	
29 ,, . . .	164	
3 August . .	473	
24 July . . .	46	240 without the fly.
27 ,, . . .	20	
29 ,, . . .	47	
3 August . .	127	

In this case there appears a great surplus among the fallen fruits of those into which the insect had penetrated, so that its effect appears rather to have been prejudicial. The trees had been abundantly caprified, and in every fruit there were generally more than one insect in the cavity, or amongst the scales; but more frequently amongst these, and round the insects, there were evident signs of corruption. The fruits without insects generally showed no alteration, excepting that in some the greater part or all the styles were faded, dried up, or slightly discoloured. But the results of the above-mentioned enumeration must not be considered as invariable, for the same fig-tree bears very differently in different years, according to the season, as well as to the quantity it bore the preceding year; and besides the finding more or less of the fruits with insects depends on the greater or less quantity of caprified fruits suspended, and the period when that was done, as there are some cultivators who caprify three times, and then the insect is found as well in the *pedagnuoli* as in the *cimaruoli.* Last year having returned to the same fig-trees, and again examined their fallen fruits, I found the proportions a little different from those I had ascertained the previous year. In the Sarnese fig the fallen fruits without insects surpassed the others by about a third; in the Chiaja and the white fig the numbers with and without the insect were

about equal; and in the Lardaro the proportions were much the same as in the preceding year.

Although I examined an infinity of ovaries in the fallen caprified fruits, I never could discover with the microscope the least sign of their having been pierced by the insect to introduce its eggs, and never found anything within resembling a grub; thence it is probable that the insect does not pierce them. I say this in order to call attention to the circumstance that the blackening and decay round the insect is not to be attributed to the puncture—which we do not know to take place, besides that the ovary itself seldom or never blackens—but to the body of the insect itself, which produces the effect either by some unknown action, or by some acrid humour it contains. Thus from the above observations it may be concluded that the fly of the caprifig is rather injurious, and that far from making the fruits remain on the tree, it either causes or facilitates their fall, especially when it has penetrated into the inside and produces decay where it dies. But this I think will happen rather to the deciduous than to the permanent fruits, because the first, even though they be pedagnuoli, are by their nature disposed to fall, hold but slightly to the branch, have but little firmness in their pulp, the florets but little grown, and the inner cavity large. If with this bad conformation, either natural or superinduced pending the growth, the fly comes to inflict further damage, every one must see that the fruit cannot on that account remain longer on the tree than it would otherwise.

Amongst a great number of fallen fruits, some, whether with or without the insect, showed a few florets which had grown more than the others, and had had time to form their embryo.

§ 13. Examination of permanent figs.

The examination of the fallen figs was naturally followed by that of those which remain on the tree to ripen, in order to ascertain whether they contained the insect, and whether it induced decay. But in this research a source of error might lie in the mistaking for permanent fruits those which might still fall before they ripen; these, however, although they may appear to hold firmly on to the bough, may be known practically by a peculiar look, by being usually badly formed, imperfectly nourished, of a paler green than the rest, and emitting when pierced a small quantity only of a thinner milky juice than the sound ones. On the 1st of August I cut from a caprified Sarnese fig a branch bearing eight fruits; one ready to fall contained the insect, so did three others of a doubtful kind, that is to say, not showing clearly whether they would come to maturity or fall prematurely, they showed the usual blackening, although slight, of the style. The remaining four, intermingled with the others, were strongly

attached to the bough, had no fly withinside, and showed no sign of alteration. Two days later, I cut from the same tree another branch with sixteen fruits, of which one with the blackened styles from the presence of the fly was in the act of falling; two of middling size and firmly attached contained the insect, not in the cavity, but amongst the scales of the mouth, and were little if at all affected; a fourth, the youngest of all, although it contained the insect, appeared to be set, and was not injured. The remaining twelve, all pedagnuoli of middling size, were sound and secure, had neither fly nor any sign of decay. On the 5th of August I cut a third branch with eleven fruits all set; four contained the insect, the other seven did not. In the district of Portici a branch of the same variety of fig with nine fruits had the insect in two fruits ready to fall, and in three permanent ones. At the same time on a Sarnese fig I found, besides a number of fruits ready to fall, with the fly, thirty-seven permanent and large fruits, of which ten had the fly. From a Chiaja fig copiously caprified I detached in the beginning of August forty-three well-set figs, of which only thirteen were without the insect, which in the others was either among the scales of the mouth or in the cavity, or in both; but always when among the scales it does little damage. And the following year, among eighty fruits of the same tree thirty-nine only had the fly, which I also found in seventy-four out of one hundred and ninety-four fruits of the white fig. In the first days of July I suspended some caprifig flower-heads to a small tree of the Lardaro which had one hundred and seventy fruits; in the course of the month forty-three had fallen; I gathered on the 14th of August the remaining one hundred and twenty-seven, which had become consolidated. Having opened them, I found them sound with good seeds: about thirty only contained the fly, which had done little if any injury to the florets.

The facts noted of the Sarnese and Lardaro figs prove clearly that it is not by the effect of the insect that the fruits remain on the tree, as the greater number of those which were the soundest and most vigorous did not contain it. The experiment made the first year on the Chiaja fig might perhaps tend to show the contrary, were it not that there was so far a greater proportion of the fallen fruits into which the fly had penetrated. That arose from the great quantity of the caprifig, which had been applied three times, so that few of the fruits, whether deciduous or permanent, could escape the insect. Therefore from the observations stated under this and the preceding heads, it follows that the insect is not the cause of the permanence and setting of the late figs. If it had been so, it would have been found only or at least chiefly in the permanent fruits, whereas the contrary

was always observed; and I am of opinion that a fig-tree, whether caprified or not, always loses the number of fruits it is destined to lose, from whatever cause, either its own temperament or external causes, and that the deciduous ones fall the more readily from the flies having penetrated into the cavity and induced decay and mould, and it may happen even that on this account many a fruit falls which might otherwise have consolidated itself and ripened. As to the permanent fruits which had the fly, I think that from their size, strength, and vigour they had been enabled to resist the effects of it, especially where it remained caught among the scales of the mouth; but as soon as they commence ripening they rot very easily, the flavour becoming affected.

But as in all our researches and experiments we have been unable to discover any reason in the world why the caprifig fly should render the deciduous fruits of the domestic fig permanent, or hasten their maturity, and as it cannot be denied that some varieties lose every year a great many, others very few, and that some ripen earlier, it would be desirable to know how this happens; and this question I will now shortly discuss.

§ 14. For what reason does the July Fig commence ripening some days earlier than the others?

Of this fact I see chiefly three causes. First the tree shoots out some days sooner than other varieties; secondly, it puts out but few or only very small early figs, which fall off very soon; thirdly, the young branches do not lengthen much and grow pretty equally, throwing out scarcely any coarse watery shoots. It follows naturally that vegetation commencing early, the flowers are also formed early, and the nutritive juices not being taken for the spring figs, nor drawn away to the extremities of the branches, are directed in greater abundance to the summer figs. What is there then surprising in their ripening a few days earlier than other varieties? The contrary effect is observed in the absence of any one of the above circumstances. The winter fig produces few small and deciduous early flowers, the growth of the branches is rather weak than otherwise, yet vegetation being about a fortnight later than in the Dottato and other figs, that is enough to occasion its fruit to ripen late. The Colombro, worn out by the quantity of early figs which attain maturity, produces late in the season only a few late ones, and those usually fall off unripe, either all or the greater part of them; indeed that the vigorous growth of new branches retards the ripening of fruit can be proved by this, that if their ends are pinched off, the ripening will take place much earlier.

§ 15. For what reasons do the White and Dottato Figs carry their fruits better than the others?

On this occasion an important question ought, if possible, to be

decided, that is whether these figs are true species distinct from each other and from all others, or whether all the domestic figs are but varieties of one species. If we could decide for the first alternative, there would be no need of further argument, as it is natural that different species distinguished by external characters should also have different constitutions. But I will admit, although I am not convinced, that all our figs are varieties of one species. The varieties raised from seed are numerous, and in some plants infinite in some respects; but that which has now to be noticed as more especially relevant to the present question, is that sometimes the constitution is altered, so that some varieties arise which feel certain influences more or less than the natural or primitive type from whence they proceed. For in a wood of chesnuts or oaks we often see variations from one individual to another. By this I mean to say that the White and the Dottato Figs, whether you consider them as species or as mere varieties, cannot be denied to have been endowed by nature with a power of carrying nearly all their fruits. But difference in habit, however slight, is usually indicated by external characters or signs; and these, caused themselves by the diversity of habit, are again the causes of other differences. So the White and the Dottato Figs are the strongest and most vigorous of all those to be found in the neighbourhood of Naples, and thrive in any soil. Their leaves are large, not much divided, coarse, especially those of the Dottato, and support well the vicissitudes of the seasons; and the leaf is the mother and nurse of the fruit. Vegetation in these varieties usually proceeds regularly as they shoot in March; they set no early flowers, and the shoots are not slender, unequal, nor attenuated, but thicken and lengthen moderately; the fruits grow regularly from the base upwards, and in the order of their age; they are moreover of a fair size, well proportioned, and, though not few in numbers, are not crowded so as to interfere with each other's nutriment. All these circumstances together produce, according to my opinion, the above effect; and the proof is clear on seeing what are the effects produced when from the vicissitudes of the season or other causes the leaves suffer; or when, the sap being irregularly distributed, the branches lengthen immoderately, and produce a great deal of wood. Then the trees lose many fruits, but always less than other varieties, being supported by their intrinsic qualities.

§ 16. For what reason does the Lardaro fig lose the greater part of its fruits?

The circumstances stated under the two last heads explain readily the case of the Lardaro. This variety, though coarse in appearance, suffers by nature much from changes in temperature and from moisture in the atmosphere; and, if the moisture is

combined with heat, it causes it to throw out a great deal of wood. It produces a good many early figs, which I have never seen ripen, although they often attain a considerable size. The leaves are deeply divided, the vegetation of the branches unequal and without order—here and there coarse shoots, which grow in a short time to a considerable length (as much as four Neapolitan palms), with twenty to thirty eyes; and whilst in other figs at the end of August the shoots either cease to grow or lose much of their vigour, those of the Lardaro continue to lengthen through September, and not unfrequently through a good part of October, having always figs in the axils of the leaves. These fruits are very numerous, and many of them ill-shapen, distorted, lumpy, and of irregular growth, often two of different ages in each axil. In such a disorderly activity of vegetation, with such a number of fruits of different sizes and forms, with so much sensibility to atmospheric influences, it is not a matter of surprise that this fig should promise much and perform little, when we see that one only of the above-mentioned causes would produce the effect; for we have stated already that the Sarnese and Chiaja figs lose a part of their fruits from producing too many. Meanwhile, I have not been able to correct the defect of the Lardaro by pruning, nor by leaving uncultivated the ground where it is growing; for that has appeared always to give it new strength to replace its pruned top, and throw out coarse shoots and make wood. Age alone and the enfeeblement of decay tames it, and then its branches, growing little and becoming less disorderly, preserve their fruits better. The difference may be observed, also, among the branches of one tree; and this to such a degree, that whoever makes comparative observations on different individuals of this variety, sees that by diversity of age, soil, exposition, disturbed vegetation, or seasons, they vary so much that he cannot easily follow the thread of explanation. But essentially the facts are the same as those observed in other trees, that is, that vigorously growing individuals produce little fruit, and, like coarse branches, only make wood, that those which produce an inordinate quantity lose a good portion, and that generally a scanty crop follows an abundant one.

§ 17. Effects of grafting.

After so many experiments had proved the nullity of any supposed effects of the fly on the domestic fig in making it retain its fruits, I one day, in a village of Ischia, came upon a Colombro fig, which seemed to show the advantage of caprification in a way to turn one's brains. It was in the centre of an airy, open garden, with a good soil, situated in a flat, and far from the sea—a large and beautiful Colombro fig, with a handsome, well-formed head, the bark uninjured, the wood every-

where sound, and of a vigour and health without equal. From its foot arose a fine, large caprifig, its boughs intermingled with those of the Colombro. This tree, which had ripened its early figs, had towards the middle of August abundance of the late crop, almost all with the fly withinside, firmly attached, and many approaching towards maturity. At some distance were other trees of the same fig, some with few, some with many of the late fruits, but none which approached in beauty to the other.

The circumstance of its having ripened two good crops, which in the Colombro so rarely happens, induced me to try to ascertain the cause. In the first place, I thought of the strength and vigour of the tree, the moderate and regular growth of its branches, the fact of its being at such a distance from the sea as not to be affected by its breezes, and the fertility of the soil, all of which together might account for the abundance of fruit. But, after some consideration, I did not feel satisfied, and had the tree cleared at its base to ascertain whether these two trees of different natures might not be naturally united, or, as cultivators term it, grafted by approximation. I found that such was the case; and further, that the two were both united in the same manner just below the surface of the soil with a Dottato fig, a few of whose suckers grew up at a little distance.

Here were two subjects of consideration suggested; first, whether, among the various effects of the stock upon the graft in influencing the abundance or size of the fruits, a similar effect might be produced by the above-mentioned intergrafting of three different things. The second point appeared to me of more importance. The vegetation of the domestic fig, by the effect of atmospheric vicissitudes, never flags or rests, at least sensibly, from spring to autumn, whether with the growth of the branches or of the fruits; but that of the caprifig rests a little after having produced the first crop, so that, when these are ripening in June or July, the young ones of the next crop are not yet appearing on the new branches, whilst those of the domestic fig are a month old, and in full growth. Such being the case, where the stems of a Colombro and a caprifig are united, and both together grafted on a Dottato, it must be admitted, in the first place, that the roots are sufficient for all three; and as between two trees joined at the base the sap must pass more or less readily from the one to the other, and as the periods of vegetation of the two do not precisely agree in the present case, who would not see that the Colombro fig, forming its second crop whilst the caprifig is at rest, must receive the greater part of that which is absorbed by so many roots, and perhaps even a little of the sap of the caprifig itself? But

leaving conjectures, which indeed are neither strange nor new, on the effects of grafting, let us return to facts easily appreciated by the senses. If the Colombro fig above mentioned bore so large a crop of fruits, not by the effect of the graft, but merely by having its boughs intermingled with those of the caprifig, the same effect ought to be produced where they are so placed without being united. And so I have seen it at Bajæ, but without the Colombro having on that account any more fruits than others far from the caprifig.

And I may now declare, that, after many years' researches, and following up all the accounts and stories of cultivators, it has never happened to me to hear of any fact, however strange, new, or singular, on this subject, that might not be accounted for otherwise than by the effects of the insect.

§ 18. What account should be taken of the maxims and experience of cultivators on caprification.

From all that is stated under the preceding heads I should place no certain reliance on comparative observations made by the lower orders on two trees, one caprified and the other not, to observe the differences. For as differences in humidity, heat, rain, atmospheric influences, soil, &c., often occur, that which you may have thought you have ascertained one year will turn out quite different another. Above all, a frequent cause of error with us is, that two trees, believed to be individuals of one variety, are, in fact, two distinct varieties raised from seed, but so near to each other that cultivators do not perceive the difference. Varieties from seed have no limits in certain plants, and are produced in such numbers that often they may not be distinguished at first sight by external signs, and often these differences are only in the constitution, as, for example, in the horse-chesnut; the seeds of which, taken from one tree, will produce a hundred individuals, which may be all alike in all their parts, raised on the same soil, with the same exposure, and yet many of them differing from the others in the number of fruits they bear in proportion to their vigour, in their size, in the periods of their budding and flowering. And that happens often to certain figs which spring up everywhere about us from seed. Thus, in the commencement of my researches, I was often deceived, believing two trees to belong to one variety, when, after a time, I ascertained that they were distinct varieties; and this happens more frequently to those races to which the caprifig is given, that is to say, to the Lardaro, the Chiaja, and the Sarnese, which partake much of the wild nature, and for that reason bear so much fruit.

I have often discussed the subject with cultivators well informed, but preoccupied with the idea of caprification; to every contradiction of mine they put forward that the experi-

ence of many years had proved to them the importance of it. Sometimes we came to the proof. When I showed them fruits not caprified ripening at the same time as others that were caprified, the most sensible of them replied that that depended on the soil, but that did not affect the property the insect has of making those fruits into which it penetrates set and ripen early. If then I showed them the number of fruits fallen from a caprified and a non-caprified tree, they always claimed the advantage; and if I said that the same fig, as the Sarnese, for instance, ripened at Ischia abundantly without the caprifig, they said that depended on the soil and on habit. Our cultivators hold it for a maxim that if a fig has once had the caprifig applied, even the white fig, which in their opinion does not require it, it feels ever after the influence; and as if having once tasted of it gets a bad habit, will the following year only produce few fruits without the caprifig. Besides, seeing the insect with so much industry and ardour work its way from scale to scale into the inside of the fig cannot, in their opinion, but produce some effect. With such and similar matter it will be admitted that I may be quite satisfied.

§ 19. Conclusions.

From the facts above stated it appears clearly—

1. That to understand well the effects of caprification, it is in the first instance necessary to know the nature of the fig and of the caprifig, and what connection they have with each other. And we have seen that the caprifig is not the male of the fig, as has been hitherto believed, but a species so different from it, that it may well be taken as the type of a distinct genus.

2. The structure of domestic figs, as well of those to which the caprifig is applied as of others, is perfectly similar in as far as concerns the organs of the flower, the structure of the seed, and of the receptacle; so that it does not appear how the insect of the caprifig can be necessary to some varieties only.

3. And we have seen by experiment that the insect neither hastens the maturity nor causes the fruit to set, whether of early or late figs, nor yet is it necessary for fecundation.

4. That the circumstance of the caprifig losing early many of the fruits in which the fly has not been bred, does not serve to prove the necessity of caprification, but rather to refute the doctrine completely, as the fly does not breed in the domestic fig; and besides, we have seen that when the caprifig bears a large crop of fruits, many of them fall unripe, even though the insect has been in it, and the grub be found in the ovaries.

5. And in respect of the caducity of the fruits of some figs, the causes must be sought for chiefly in the constitution and mode of vegetation of those varieties; and also in the soil, climate, and vicissitudes of the season.

6. That thus caprification is useless for the setting and ripening of fruit, and therefore this custom, which entails expense and deteriorates the flavour of the figs, ought to be abolished from our agriculture.

§ 20. Conjectures on the origin of caprification.

Having now reached the term of my labours, I cannot conceal a certain anxiety which has secretly grown up in my mind. I fancy I hear from all quarters that the custom of caprification being of such ancient date, and having been upheld by so many distinguished men of science both ancient and modern, cannot but be founded on experience, against which no theories, no subtleties of science are of any avail. Verily does the rise of such ideas in my breast so agitate me, that many times in the midst of my labours my breath has been stopped by the fear that some fact ill understood has drawn a veil over my mind. Nor should I ever have ventured to publish this treatise were it not that I thought some consideration was due to the labour I had bestowed on it. Where the love for a subject induces one to undertake a work, the work itself increases that love. Besides there is the hope that, if not the whole, some part of it, at least, may prove useful to science. Of this it behoves others than myself to judge.

But independently of all such considerations, I may in courtesy be allowed some conjectures on the origin of caprification, and how it has become spread among us. The time when it began is entirely unknown, for the first record of it is in Herodotus, who lays it down as a proof of the dependence of the female date on the male, as of the fig on the caprifig. Certainly experience proved to cultivators the case of the date-tree. Experience, therefore, many would say, proved to the Greeks the necessity of the caprifig for the fig. But it is not everything which our ancestors have handed down to us, by history or by popular tradition, that has been proved by experience, and often has analogy been confounded with experience. Let us suppose that the case of the date-tree was first known, and that some one observing the caprifig, with its coarse, wild aspect, and with its fruits not good to eat containing the fly withinside, should have conceived the idea that it was necessary for fertilizing the fig; this would not have been a demonstration, indeed, but a plausible supposition. And how many theories are there not built upon a few facts generalised by conjectures, analogies, and possibilities! These theories in course of time are proved or refuted, and often last a long time in spite of refutations, so difficult is it to turn the mind away from strong impressions and preoccupations, and to turn it away from habit; and habit is of such force that it becomes a second nature, as the old and popular saying has it. And when a maxim is once taught to

the lower orders, especially to those living in the country, who are more tenacious of their habits and customs, every one knows how difficult it is to get the better of it, especially when it is connected with the hope or possibility of gain, and is ancient. Now who can say that the custom of caprification did not arise and spread amongst cultivators in some such way? And habit is so great in this class of persons, that often they will not see their own loss and the gain of others, preferring to die in their errors, rather than better themselves by the example of others.

Certain facts, either at first inexplicable or marvellous in appearance, have often given rise to popular opinions, which from the remotest antiquity have come down to us from generation to generation. Certainly, from the sight of the moon springs up at once the desire to know its properties; and at its brilliant and even marvellous aspect every one is naturally disposed to grant to it a large influence over the things of this world; and cultivators of old consult its phases for the periods of confiding seeds to the earth, or felling trees; from that body, in short, they deduce either the probability or the certainty of good or evil. I myself have no experience on the influence of the moon; but I believe that among popular credences, supposing them not to be all erroneous, none are more so than this on seed-sowing. In vain, however, would it be to tell the cultivators of their error; all with one voice cry you down with *experience*, and you must be silent; experience being the sensible ground for reasoning on phenomena, there is no appeal against it; and however great and numerous the proofs you have to the contrary, the general opinion resolutely maintained at length puts you to silence. But the case of the moon, you say, has nothing to do with caprification. But do you believe, that on seeing for the first time the different kinds of receptacles of the caprifig, the insect propagated within them, this same insect afterwards issuing forth and penetrating into the domestic fig, forcing its way from scale to scale of the mouth, in a manner which one would have been at a loss to imagine,—do you believe, I repeat, that this fact would not suggest to your mind some great design of nature to be fulfilled? And this was observed by the ancient Greeks, a people of lively imagination, who in all natural phenomena, in many plants and flowers, saw secrets, and wonders, and records, and living signs of human affairs.

It is certain that the practice of caprification came to us from Greece, if we give faith to Pliny, who says that in his time it was in use in the islands of the Archipelago, and entirely unknown to the Italians. But at what precise time it was imported I am unable to say; writers on rustic affairs in the thirteenth

century speak of it as a thing practised in some places, and they then knew not how it came amongst us. What appears to me to be interesting is, that it was adopted by us precisely as the ancients had it; the opinions of our cultivators being the same as those of the Greeks as to its utility. Among country people, the most remote traditions are perpetuated without any alteration of consequence. We read, for instance, in Dioscorides, that the mandrake has secret virtues, and that it is used by witches. Now in some parts of our country, where the plant is common, the same opinions are held of it. As I was wandering one day about some fig-grounds near Naples, I observed suspended to some fig-trees some of those spongy excrescences found on elm-trees, and occasioned by some aphis or pulex for the purpose of propagating within it. Having asked what was the use of it, I was answered by the cultivator that those spongy excrescences were as good as the caprifig to make figs set in abundance, and that he had been taught the receipt by his father, who had proved it, and his own experience had confirmed the advantage of it. This is without doubt an absurdity; yet the same thing may be read in Theophrastus, and afterwards Palladio, in his chapter on the fig, says, "And if there is none of this" (*i.e.*, of the caprifig), "a branch of wormwood may be suspended, or the excrescences which are found among the foliage of the elm." Such is one of the numerous examples of ridiculous and strange practices in use among the lower orders from the remotest periods; however contrary to reason, they remain in vogue, and those who believe in them and practise them allege experience in justification. Certainly, as we have already said, experience is the groundwork of all sound reasoning on phenomena, and we ought on every occasion to follow it; but in speaking of experience, we must know by whom and in what times it was had.

Returning to caprification, from which we have somewhat diverged, neither its antiquity nor the experience of cultivators are of any account. I do not wish to disparage the labours of so many great men who have written upon it; but I only say that they made no experiments; the ancients, like Aristotle and Theophrastus, relating what was the practice, and Cavolini and Gallesio preoccupied with Linnæus's opinion.

XXIII.—*Journal of a Mission to California in Search of Plants.* By Mr. Theodor Hartweg, in the service of the Horticultural Society. Part IV., continued from Vol. II., p. 191.

(Received June 6, 1848.)

With January the rains set in unusually severe; the Salinas and other rivers, which are fordable during ordinary seasons, have now become impassable.

The first indications of the returning spring I observed in the flowering of Garrya elliptica, Berberis aquifolium, Ribes speciosum, R. malvaceum, Arctostaphylos, Nos. 158, 159, and 160; Vaccinium, No. 157, a dwarf shrubby Prunus (No. 162), with white pendulous flowers, and Ornithogalum, No. 163.

When the weather permitted it, I continued my rambles on foot in the mountains of Monterey, and discovered on the western declivity, within two miles of the seashore, a species of Pine which I had not found previously. The leaves are two in a sheath, three to five inches long; cones in clusters of four to seven, oval, three inches long by two broad, of a reddish brown before they are perfectly ripe, then changing into light brown; scales pyramidal, terminating in an ash-grey sharp point. The trees attain no great elevation, averaging twenty feet, rarely thirty, with a stem of twelve inches in diameter; they are confined to half a square mile, and like P. insignis, by which they are surrounded on all sides, thrive in coarsely decomposed granite. This species, which appears to be new, I have named, in compliment to Thomas Edgar, Esq., the Society's Treasurer, Pinus Edgariana.

In the same locality with the above Pine, I observed a Cypress (Cupressus, No. 166) with smaller cones than C. macrocarpa, of which it seems more than a variety, being a stunted shrub six to ten feet high.

Returning by a different route, through a thick brushwood of Arctostaphylos and Ceanothus, I found on the steep acclivity, in a shaded dell, a Rhododendron, without seeds or flowers, forming a shrub five feet high, well beset with flower-buds, and Castanea chrysophylla * in the same condition; this evergreen Chestnut forms a shrub three to eight feet high, of a pyramidal shape, with persistent lanceolate leaves, green above, and of a rich golden yellow below. From its situation, and habit in general, it may be expected, if I am fortunate enough to introduce it, to withstand the ordinary winters about the neighbour-

* What was called so formerly is a different species of Castanea.

hood of London, since it is known from experience, that Ceanothus thyrsiflorus, with which it grows, is of that degree of hardiness.

In February, Dodecatheon, No. 170, appeared everywhere common, as also Fragaria vesca, Cardamine, No. 174, No. 175, Viola, 176, Saxifraga, 178, Trillium, 182, T. 183; of shrubs, two species of Ceanothus, the one producing numerous bundles of blue flowers from the axils of its small evergreen leaves, the other, C. thyrsiflorus, often attaining the size of a small tree, sending forth its numerous heads of azure flowers from last year's wood. In the sandy plains towards the river Salinas, the large, golden-flowered Viola chrysantha, Nemophila insignis, Eschscholtzia crocea, and E. californica were common.

My sojourn in California being restricted according to my instructions to one year, whilst a similar period is to be devoted to visiting the northern provinces of Mexico, or in case I find this country a favourable field for my exertions, permission having been granted, until I receive orders to the contrary, that I may stay the whole term of two years in California: I resolved, in the absence of new instructions from the Council of the Society, not to proceed to northern Mexico, where, during the war with the United States, my peaceful occupation might be disturbed, and my personal safety endangered, but to remain another season in California; more especially as, from my late arrival in this country, and subsequent circumstances, I could not extend my excursions as I intended to have done. The next step to be considered is, whither can I proceed to follow my occupation with satisfaction to my employers and myself? This country has been taken possession of last year by an American force, much against the good will of the Californians. Now, although the country is apparently quiet, it is difficult to foretell how long it may last, and if these disturbances should break out again during my busy season, it might seriously affect my plans. I therefore came to the conclusion of visiting the Sacramento Valley, where the settlers are all foreigners, and where I need not be under any apprehensions of disturbances in the lower country.

Accordingly I embarked on the 8th of March on board the American bark Tasso, and arrived at Yerba Buena after a passage of five days. A few days' detention enabled me to examine the neighbourhood, and added to my collection, among other less interesting plants, a white Myosotis, No. 190, Liliacea, No. 192, Œnothera, No. 194, a scarlet Aquilegia, No. 198, Iris, No. 204, and Ribes echinatum, the latter common on the sandhills that surround the town.

On March the 23rd I embarked in a small launch with Mr. Cordua, who was proceeding to his farm in the Sacramento

Valley, and who kindly invited me to make his house my head-quarters; an invitation which I gladly accepted, as from his long residence in the country, and the situation of his farm, in the centre of the valley, I anticipated many happy results. Late in the afternoon of the following day we arrived at the Corte de Madera, which, as the name implies, is a wood-cutting establishment, where Mr. Cordua had some business to transact. Half-an-hour's ramble in a fine grove of redwood trees furnished me a brown, small flowering Martagon, No. 218, Boraginea, No. 217, and Equisetum, No. 219. The same night we left again, and passing the following morning through the straits of Carquinez into Suisun Bay, we entered the river Sacramento in the afternoon. The aspect of the country is flat, presenting a boundless field of rushes as far as the eye can reach, bordered on both sides by a distant ridge of mountains, which, from the severity of last winter, presented a line of snow. The lowlands of the Sacramento are subject to inundations during the spring months, and are destitute of trees, with the exception of the banks, which, from the accumulation of soil during the inundations, are higher than the rushlands; a belt of trees and shrubs, varying from thirty to two hundred yards in depth, extends along the banks, and is chiefly composed of Oaks, Platanus, Willows, Poplars, Ash, Negundo californicum, Pavia californica, Cornus, a dwarf Birch, and a Grape-vine.

After a tedious process of warping up the launch against a strong current, we arrived at the landing-place of Fort Sacramento, on the 31st of March. An ineffectual attempt at doubling a point against a strong head wind, during which we narrowly escaped being capsized, determined Mr. Cordua to leave the launch and proceed by land; we accordingly disembarked at the mouth of the American Fork, and following that stream about six miles, we arrived at Mr. S.'s. Having procured horses the following morning, after a day and a half's ride we reached Mr. Cordua's farm, situate on the left bank of the Sacramento, at the junction of the Chuba with the Feather river, which twenty miles below falls into the Sacramento.

The vegetation in the Upper Sacramento valley is much earlier than about the bay of San Francisco; there the trees were still apparently dead, whilst here the Oaks were sending forth their young leaves, and the prairies were teeming with flowers, among which I recognised many old acquaintances. It was delightful to behold the variety of colours over the extensive prairie, produced by patches of Leptosiphon, No. 205, L. No. 228, Gilia tricolor, G. capitata, Oxyura chrysanthemoides, Platystemon californicum, Nemophila insignis, N. No. 222, Composita, Nos. 208, 209, Viola, No. 212, Eschscholtzia crocea,

E. californica, Delphinium, No. 224, and, in places where water collects during the rainy season, Martagon, No. 216, with dingy yellow flowers spotted with brown, Mimulus tricolor, two inches high, Limnanthes pulchella, No. 214, having an abundance of delicate pink flowers.

On April the 13th I left with Mr. L. for his farm, seventy miles higher up in the valley. Mr. L. had been in the lower country, and came up thus far with his goods in a large canoe, and was now proceeding with them in waggons. Crossing Feather river, which here is eighty yards broad, and of considerable depth, our course lay five and twenty miles along that river, through a beautiful wood of evergreen and deciduous Oaks: here I found, in sandy tracts, Leptosiphon, No. 232, with white fragrant flowers; Collinsia, No. 238, C. bicolor, the latter invariably growing at the foot of large oaks.

Leaving Feather river, we struck across a prairie for twenty miles: here immense fields of Eschscholtzia crocea, E. californica, and Ranunculus, No. 239, presented themselves, each species growing by itself, which with the plants observed on Mr. Cordua's farm, and Lupinus nanus, Delphinium, No. 205, No. 236, Trifolium, No. 237, Compositæ, Nos. 241, 242, 243, Œnothera, 244, Malvacea, No. 246. produced a splendid effect. A small patch of the beautiful little Leptosiphon aureus, with golden flowers, I also found in the open prairie; it is, however, by no means common.

The prairies in the Sacramento valley are divided by small rivers, termed "creeks" by the American settlers: these creeks generally have a border of Oaks upon their banks, which also extend over the rich bottom lands. In the dry beds of these rivers I observed plants, which nowhere are to be found on the prairie, the seeds of which have evidently been carried down from the mountains during the rains, as for example, Pentstemon azureum, No. 255, P. No. 313, Umbellifera, No. 257, with an aromatic tap-root, held in repute among the Indians for its medicinal properties; in rather damp places, Clintonia elegans, C. pulchella, and Limnanthes alba, No. 315.

A four days' slow drive with the waggons brought us to the farm of my companion: the vegetation here differed in no respect from that already observed in the valley.

An opportunity of visiting the mountains was afforded me a few days after my arrival, which I embraced with pleasure, as from the hostile character of the mountain Indians towards the settlers, it was not deemed prudent for me to make an excursion in that direction, attended by a guide only; I therefore joined a party of settlers who were going to the mountains to examine the timber, and if possible to find a site for a sawmill.

On the first evening we encamped under a large oak, near Pine creek, a little mountain rivulet; here I found Asagræa, No. 273, Lychnis. No. 286, Umbellifera, No. 302, Triteleia, No. 301, with a head of pink flowers supported on a *twining* stem, five feet long; in the creek Saxifragea, No. 296; of shrubs and trees, Ceanothus, No. 285, evergreen and deciduous Oaks, and Pinus Sabiniana. This species of Pine, of which I saw some small trees near Monterey last year, rise here to the height of fifty or sixty feet, with a stem of six feet in circumference, and possesses none of the regularity so characteristic of the Pine tribe. The branches, which in other Pines stand in whorls, are in this species quite irregular (except when young), which, combined with the paucity of its partly bent down, glaucous leaves, gives the tree a peculiar appearance.

Early the following morning we ascended the gradual acclivity, and passed through a brushwood entirely composed of Ceanothus, No. 285. At noon we arrived at the edge of a noble Pine forest; a few moments' rest, during which one of our companions shot a deer, enabled me to collect Viola, No. 287, Erythronium, No. 288, Prunus, No. 289, Lilium, No. 294, Cyclobothra, No. 295. The species of Pine composing the forest is principally Pinus Benthamiana, with a few trees of P. Lambertiana, Abies nobilis, and a species of Thuja intermixed, No. 309, Ceanothus, No. 284, spreading on the ground, and Cornus florida, No. 297, were the only plants observed in the pinewoods.

On our return through a steep ravine, I found a shrubby Cercis, No. 282, with pink flowers, Prunus, No. 283, and again Cyclobothra, No. 295.

By the end of April the prairies in the Sacramento valley assumed a different aspect; two weeks ago they were a carpet of flowers, which have now disappeared, and a yellow, sickly tinge pervades the whole: such is the rapidity of vegetation under the cloudless sky of a tropical sun. Bulbous plants now make their appearance; the most common being Triteleia laxa, which not only grows in the open prairie, but also in the shaded and damp lowlands; a pure white variety of it I also found: it is, however, by no means common. Calochortus, No. 306, is also very frequent; a whitish variety occurs occasionally along with Brodiæa congesta, B. No. 274, B. No. 326, Liliacea, No. 250, and Liliacea, No. 300.

Being now aware of the rapidity of Californian vegetation, I lost no time in collecting such seeds as were worth taking, and returned to my head-quarters by the beginning of May. Most kinds had, during the fortnight I first saw them in flower, ripened their seeds, and it was with difficulty I found a few grains of

the beautiful little Leptosiphon aureus, and similar plants, which, between their taller neighbours, had almost become invisible.

An excursion to the "Butes," an isolated group of mountains between the Sacramento and Feather rivers, furnished me with Campanulacea No. 316, C. No. 317, Scrophularinea No. 318, Compositæ Nos. 319 and 320, Gilia No. 324, G. 335, Linum 325, Trifolium No. 331, Labiatæ No. 333, Asclepias No. 338, Clarkia elegans, Lupinus densiflorus, Asclepias No. 338, and Umbellifera No. 339, called Yerba de la vivora, the leaves and stem of which are universally used with success against the bite of rattlesnakes.

From the rocky summit of the Butes a beautiful view is obtained of the Sacramento valley; during the time of my visit, the lower country, owing to the melting of the snow in the mountains and consequent inundations, presented an immense lake.

Another excursion I made to the mountains led along the right bank of the Chuba river, over the now parched up prairie. A ride of fifteen miles brought me to the foot of the mountains. The lower range, as in the former visit higher up in the valley, is occupied by Ceanothus No. 285, a few live Oaks, and Pinus Sabiniana. Following a small rivulet, I found there Mentha No. 348, Labiata No. 352, Stenactis No. 353, a shrubby Labiata No. 355, with large white flowers, and Collinsia tinctoria, No. 354. This new species of Collinsia is of stronger growth, though less striking, than C. bicolor; it grows chiefly in the dry sandy bed or on the banks of the rivulet, and produces its yellowish flowers mottled with purple much later than C. bicolor. On a subsequent occasion, when I returned to this place, to procure seeds of it, my hands were stained yellow by the glandular hairs which cover the seedpods, from which circumstance I named it Collinsia tinctoria.

Another interesting plant I found on this excursion is Nemophila speciosa, with white petals, one-third of which is tipped with purple. It grows generally near rivulets, or in damp and partly shaded places. If the few seeds I procured should vegetate, it will prove a great acquisition to that handsome genus.

The higher part of this range of mountains is less accessible than on the former visit. My endeavours to proceed farther were eventually frustrated by the steep banks and swollen state of the Chuba.

By the beginning of June I set out again, in company with Mr. Cordua and an Indian, to visit if possible the snowy heights of the mountains, generally termed by emigrants from the United States the Californian Mountains. After crossing the Chuba river we struck across the prairie, and entered the mountains

near Bear Creek, where we encamped towards evening in a grove of Pinus Sabiniana and Oaks. The vegetation here differed in nothing from that observed on the right bank of the Chuba on a former visit. Calochortus, No. 306, which had been very common throughout the Sacramento Valley, was still in flower here, the white variety being more frequent than the yellow.

Early the following morning we were *en route* again, passing through an interminable wood of Pinus Sabiniana and Oaks. Here I observed a pretty little Allium, No. 357, with purple flowers; Asarum, No. 364; Viola, 365; V. 366; Polemonium (?), No. 382; Hosackia bicolor; Mimulus bicolor, No. 376; and M. 377—the two last luxuriating in the sandy bed of dried up rivulets. Ascending the gradual acclivity, we left the region of Pinus Sabiniana, and entered that of Pinus Benthamiana, which seems to be the characteristic of the upper region.

Some trees of this noble Pine attain an enormous size. The largest I measured were 28 feet in circumference, and 220 feet high. Of equal dimensions is P. Lambertiana, which however does not constitute masses by itself, but is thinly scattered among the former. The same is the case with Thuja, No. 402, which rises to the height of 130 feet, by 12 to 15 in circumference.

Few plants occur in these Pine tracts, the principal being Cyclobothra, No. 370; C. No. 371; C. No. 372; Calliprora, No. 384; Iris, 373; Papaveracea, No. 383; and, in shaded places, Rubus, 374; Philadelphus, 375; Spiræa, 381; Pyrus florida, No. 387; Rosacea, No. 392; and Taxus, No. 401—the latter, judging from the few specimens I saw, attaining only the size of a shrub or small tree.

On the fourth day we reached Bear Valley, a beautiful little mountain valley surrounded by a lofty ridge of mountains, which is well wooded with Pinus Benthamiana. The north side of the valley was still covered with snow. On the south side, however, a few spring flowers had made their appearance, among which I observed Pæonia californica, with brown petals edged with orange; Compositæ, No. 398; ??, No. 395; Ranunculus, No. 363; Corydalis, No. 362; and Nicotiana, No. 367. A new species of Pine, P. No. 413, occurred in the valley, of which I only saw two trees of dwarf growth, probably stragglers from a more northern latitude. The leaves stand in pairs, and are three inches long; cones two inches long, by one broad. In general appearance the tree is not unlike a young Scotch fir. The cones at the time of my visit were open, and the seeds had fallen out.

The upper end of the valley is bounded by a mass of granite, terminating in a precipice 800 feet in depth, below which the Chuba river is winding its way, appearing like a sheet of foam. In warm and sheltered situations, where the snow had melted, I

observed an Allium; Pentstemon, No. 368; Statice, No. 369; Phlox, No. 380; and a Calochortus—the latter not yet in flower. The more elevated parts above Bear Valley, from the severity of last winter, were still several feet deep, covered with snow, for which reason we returned hence by the same road we came.

Immediately upon my arrival at head-quarters, I proceeded once more to the Upper Sacramento Valley to collect such seeds as I could not procure before.

Having packed up my collections, and sent part by water to San Francisco, I left on the 30th of June for Monterey, in company with an American whom I had engaged as guide. Towards evening of the same day we arrived at the junction of the Feather river with the Sacramento; and passing, the following morning, our luggage over in a canoe, we swam the horses across, the distance from shore to shore being not less than 300 yards. We now continued our course over the prairie on the right bank of the Sacramento river for two days, and crossed again to the south side in a ferry-boat, at the Straits of Carquinez.

A kind of tertian fever, accompanied by violent headache, under which I had been suffering some days previous to my departure, here developed itself into a quotidian fever and ague, which for want of proper medicines, the constant exposure to a tropical sun during the day, and camping out at night, soon reduced me to such a state of debility as scarcely to be able to sit on horseback.

From the Straits of Carquinez we passed along the Bay of San Francisco to the Pueblo of San José, and reached Monterey on the 8th of July.

Soon after my arrival (having, with the assistance of my little medicine-chest, cured myself), I continued my excursions about Monterey as far as my returning strength permitted, and collected such kinds of seeds as I thought worth preserving. Towards the end of July I went over to Santa Cruz for a similar purpose, and whilst visiting a family upon their farm, with whom I had become intimately acquainted during their winter residence in Monterey, I was again taken ill with fever and ague. In addition to the seeds which I collected in the Santa Cruz mountains last year, I found the evergreen Chestnut with ripe fruit. This shrub, of which I had been most anxious to procure seeds, attains the height of ten feet, and is of a pyramidal form. The nuts, which are produced in prickly clusters on the points of the young wood, are each enclosed in separate cells, and are of the same size and shape as the beech-nut. The kernel is pleasant to eat, resembling the filbert in flavour.

On August the 13th I returned to Monterey, and was once

more laid up with fever and ague, from which I did not recover until the beginning of September.

On September the 6th I went again over to Santa Cruz in quest of pine-cones, which were now ripening. The sorts I procured were Abies Douglasii, Pinus californica, and P. Benthamiana. The cones of the latter were unusually scarce this season, and seem to have suffered from late spring frosts. A few cones were all I could procure of this sort. They were smaller than those of the preceding year, and contained but few good seeds.

On September the 20th I again left Monterey for the southern parts, which, on account of the disturbed state of last year, I could not visit before. As guide I engaged the services of a man who had accompanied me on my last excursion to Santa Cruz, and who, from his profession as a hunter, was well acquainted with the intricate mountain paths of the district I intended to visit. On the day of our starting we reached the mission of La Solidad, an ill-constructed, half-ruined building, situate in the Salinas valley, and encamped towards evening on the banks of the Salinas river, within a short distance of the mission.

By sunrise the following morning we were again on horseback, and leaving the main road on the right, we entered a mountain defile leading to the mission of San Antonio. Here I observed a shrubby Arctostaphylos, with large brown seeds; a half-climbing Caprifolium (C. No. 133), profusely covered with scarlet berries; an evergreen shrubby Oak (Q. No. 8); and a subdeciduous Oak (Q. No. 7), the latter forming a tree 30 feet high.

From San Antonio a range of mountains extends along the coast, attaining a great elevation, which, although apparently barren as seen from the mission, I was assured on the western flank towards the sea is covered by large Pines. The lower region of this range, at the foot of which the mission is built, is thinly covered by the evergreen Californian Oak, a Ceanothus, Cercocarpus, a small-leaved shrubby Fraxinus, and Pinus Sabiniana—the latter at the time with ripe cones. An evergreen shrubby Prunus, called Islay, with a holly-like leaf, bearing a red fruit resembling the cherry-plum, grows also abundantly here. The thin pulp which surrounds the proportionate large seed is sweet and pleasant to eat. The kernel, after being roasted and made into gruel, is a favourite dish amongst the Indians. Having ascended the first ridge, we passed through thickets of Arctostaphylos tomentosa and Ceanothus thyrsiflorus, and entered a forest of Pinus Lambertiana. The cones of this noble Pine are always hanging from the points of the branches, were by this time already open, and the seeds had fallen out. From cones that had been blown down, I picked out a few seeds.

Descending the western flank of the great mountain range, I found at last the long-wished-for Abies bracteata, occupying exclusively ravines. This remarkable Fir attains the height of 50 feet, with a stem from 12 to 15 feet in diameter, one-third of which is clear of branches, and the remainder forming an elongated tapering pyramid, of which the upper part, for three feet, is productive of cones. Having cut down some trees, I found to my regret that the cones were but half-grown, and had been frost-bitten. In more sheltered situations, towards the sea-shore, the same happened to be the case; and I was thus precluded all hope of introducing this remarkable Fir into Europe.

Finding it impracticable to prosecute my journey to the south along the coast, from the numerous ravines which descend from the mountain range, I returned hence to San Antonio, and crossed by the farm of El Piojo, where the ridge is less elevated. A small Pine wood, which became visible on our descent, extending along the beach, looked like an oasis in the desert—the dark green of the Pines forming a beautiful contrast with the parched-up fields. Upon a nearer examination I found the wood to be composed of a variety of Pinus insignis, with larger cones than those about Monterey, from which it also differs in their being produced in less abundance. Following along the sea-shore for nine miles, we struck inland again, and arrived at the mission of San Luis Obispo, from whence we proceeded over a flat and uninteresting country to the mission of Santa Ines. The whole of this route is but poorly wooded by a few stunted Oaks. On the ascent to the mission of La Purissima, the monotony of the bare hills was somewhat relieved by a small forest of Pinus Edgariana, which attains no larger size than those observed near Monterey.

Previous to leaving Monterey I was told by several persons that a kind of thin-shelled pine-nut is occasionally brought for sale by the Indians to Santa Ines and Santa Barbara, without being able to learn any more respecting it. Upon making further inquiries at Santa Ines, I was told that the Indians bring them from a great distance, that the harvest of them was over, but that I might procure a few of the mission Indians. Proceeding to a hut which was pointed out to me, I bought a gallon of the fresh seeds; and inquiring about the size of the cones, the Indian handed me two, with the information that the trees are of a small size, when, judge my surprise, I recognised in them those of Pinus Llaveana, which I had on former occasions found in several parts of Mexico.

Seeing there was no prospect of enriching my collection of seeds by proceeding further to the south, I returned from Santa Ines to San Luis Obispo, near which mission the late Dr. Coulter gives the station of Pinus muricata, and which seemed to have

escaped my notice when first passing through that place. Upon a nearer examination I found that on the "Crusta," or ascent from San Luis Obispo, only one kind of Pine is growing on the brow of the mountains, which proved to be P. macrocarpa.

From San Luis we returned to San Antonio, over a flat and uninteresting road, and thence to Monterey, where we arrived on the 18th of October.

On October the 25th I again left Monterey, with my former guide, to visit the continuation of the San Antonio range of mountains, which, from the nature of the ground on that side, I attempted now by a different route. Following along the sea-coast over a succession of hills intersected by numerous deep ravines, we found our further progress impeded on the third day by the extreme steepness of the range. The only objects derived from this excursion were some very fine cones of Pinus macrocarpa, some measuring 15 inches in length; they were growing on trees 30 to 40 feet high, in rather exposed situations, at an elevation of about 4000 feet above the level of the sea.

By the beginning of November we returned to Monterey; the rainy season being now close at hand, and having no more excursions to make, I prepared to return to Europe with my collection.

Owing to the little traffic carried on between California and the western ports of Mexico or central America, I did not procure a passage before the 5th of February, when I embarked on board the Hawaian schooner 'S. S.' bound for Mazatlan, and thence to the coast of Central America. After a run of twelve days we arrived at Mazatlan, where I learned that it would be extremely hazardous to pass across Mexico with my collection during the present disturbed state of that country; I therefore, after a detention of a few days, proceeded in the 'S. S.' to Iztapa, the port of Guatemala, where we arrived on the 16th of March. On the following day I landed with my collection and luggage, and having easily procured mules to go on to Guatemala, distant 100 miles, I arrived there on the third day, accompanied by the supercargo, an American gentleman, who was proceeding to the United States. Half an hour's talk with my old friends, who were very glad to see me once more, convinced me of the necessity of retracing my steps to Iztapa, as the country is in a very unsettled state. The same party who, during my former stay in that country, had raised Carrera to power, were now opposed to him, and held possession of the road by which I ought to pass in order to reach the British settlement of Honduras. Under these circumstances I returned with my companion to Iztapa, and embarked once more on board the 'S. S.' for Realejo in the state of Nicaragua, where we arrived on the 1st of April. On the 5th we set out on

horseback from that place for Granada on the borders of the Lake of Nicaragua, having hired for the conveyance of my collection and luggage a cart drawn by oxen, which performed the distance of 150 miles in six days, whilst we arrived in four. At Granada we embarked in a canoe, and keeping close in shore on the northern side, arrived after three days' rowing at the eastern extremity of the lake, whence we began to descend the river of San Juan, and reached the settlement of San Juan de Nicaragua on the 21st of April. On the 24th I took my passage on board the 'Severn,' one of the West India steamers, and arrived at Southampton, after a very fine passage, on the 3rd of June.

XXIV.—*Description of the Fruit of an Apricot Tree growing in my Garden at Betias, near Suedia, in the Pachalik of Aleppo.* By John Barker, Esq.

This variety was produced seven years ago from the stone of the sweet-kernelled apricot of Ispahan, called "*Shuker Para*" (a bit of sugar). It bore one fruit in 1845. Last year it bore 30, and now, June the 16th, 1847, it is bearing 140 ripe fruit. It is the latest but one of the 13 varieties of the apricots with a sweet kernel in Suedia. It is a free-growing healthy tree, and a great bearer. Of upwards of 300 grafts and buds "worked" from it, only two or three failed. This year four of its medium-size fruit weighed $4\frac{3}{4}$ oz. (Troy), and five of the largest $8\frac{1}{2}$ oz. Four of the medium-size stones (from a fruit just gathered) weighed only 2 drams. They were cracked easily with the teeth. Its diminutive stone is its peculiar distinction; it is not a cling-stone. It is rather conque-shaped. The colour yellowish-white one third, and dingy purplish-light-red the other two.

It resembles the "Elruge" nectarine, not merely in colour, but somewhat in form, and in its absolute absence of all down. It resembles likewise the nectarine in the peculiar consistence of the skin. The skin cannot be *peeled*, but it must be well masticated while its sugary, soft, juicy pulp is in the mouth, in order to correct the excessive sweetness of the latter, because the only particles which contain acidity reside in the skin, for which reason it is often eaten preferably ten days before perfect maturity. It has great affinity to the plum by reason of its smooth skin, its small stone, of a sweetness that not merely rivals but surpasses that of the green-gage, and more than all of its almost absolute want of the apricot perfume. All other sorts of sweet-kernelled apricots have more or less a bitterish sour *after-taste*, as if the remnant of a bit of sugar-candy still lingered in your mouth.

Two anomalies relating to "*The Suedia Green-gage Apricot*"

are remarkable. The first may not properly be called an anomaly, if it should have been observed by scientific gardeners in the germination of other seeds; but the second is assuredly an anomaly. 1st. The kernel, although sweeter than the sweetest almond before being sown, becomes very bitter as soon as it begins to germinate. 2nd. The fruit, when its kernel is still soft and watery, and not bigger than a large marrowfat pea, is intensely bitter. Other sweet-kernelled apricots that are *lusus naturæ*, and not a species like this, possess not the same peculiarity.

As the extraordinary sweetness with which this fruit is endowed begins to be developed ten days before attaining to perfect maturity, it bears being transported to a considerable distance. Captain Wells averred, that when a few years ago he was stationed in a northern province of India, he had it annually sent to him, "packed in cotton," from the incredible distance of a month's journey by caravan!

But the most interesting fact remains to be stated. It reproduces itself from seed, having a sweet kernel and all the other admirable qualities, as certainly as does any vegetable in the kitchen garden.

[NOTE.—I have eaten this Apricot in a dried state; and as far as I can judge from it in that condition, it seems fully to correspond with the foregoing description.—J. L.]

XXV.—*Notice of a Visit to Pitmaston, near Worcester, May 25, 1848.* By Robert Thompson.

THE name of John Williams, Esq., of Pitmaston, must be familiar to every one who has read the Transactions of the Horticultural Society, for to them, and the Journal of the Society, he has contributed many papers. The first was written in 1808, forty years ago, since which period twenty-eight of his communications have been published in the above-mentioned works. The intimate friend of Mr. Knight, the late President of the Society, he was well acquainted with the physiological investigations and experiments which that gentleman carried on. The theories of these physiologists, resulting from long-continued observations made in comparative retirement, on the processes of vegetation, are admitted to have given a great impulse to horticulture, either from their immediate bearings, or indirectly by inducing others to think. We are indebted to Mr. Williams for some excellent varieties of fruits which he has raised. For instance, the Pitmaston Orange Nectarine, a rich melting fruit, standing quite unique in the classification of nectarines, for it is the only melting nectarine with globose glands and large flowers. The Pit-

maston Nonpareil, the Russet-coated Nonpareil, the White Fig, and Pitmaston Green Gage Gooseberries, are all of first-rate excellence. The Pitmaston White Cluster Grape has long been known as one of the best and earliest for walls; and Mr. Williams has lately raised a variety between the Black Hamburgh and Black Prince, called the Black Prince-Hamburgh, which colours better than the Hamburgh. Many other kinds of fruits have resulted from his crossings.

Pitmaston lies a short distance north-west from the city of Worcester, only about half a degree north of the London parallel of latitude; and being rather sheltered, the climate may be considered equal to that of the neighbourhood of London. Besides it is less damp, having a warm soil resting on red sandstone of the secondary formation. From the lawn the Malvern Hills are seen in the distance westwards. The fruit and kitchen gardens are partly on a slope facing the south-east, and are situate to the north-west of the house, from which however they are excluded by a large rockwork which bounds the lawn in that direction. Some large elms outside afford shelter from north and north-east winds. The rockwork is backed by a wall, not seen from the front, but pinnacles surmounting the wall at intervals appear in view. The upper and strictly architectural portion of these pinnacles arises from coarser workmanship in form of the frustum of a cone, and this lower part was formerly covered with ivy; but the variety of ivy employed was considered too broad-leaved and loose, and Mr. Williams intends to substitute narrow-leaved varieties. The rockwork can be ascended and traversed by winding paths. Beneath, a vaulted passage, with an ancient groined roof, extends from one end to the other.

One garden is enclosed by a circular wall, but Mr. Williams does not suppose that this form affords any advantage, and therefore would not prefer it were he now to enclose a garden. In particular localities I have observed almost a tornado generated in an area enclosed by a circular wall. Besides it is well known that any piece of ground not bounded by parallel straight lines is comparatively more expensive to work.

In this garden a brown Turkey fig, trained against a south-west aspect, was bearing an abundant crop. The fruit was not merely at the extremities, as is usually the case out of doors, but at intervals all along from the bases of the shoots upwards. For example, a shoot 40 inches in length had 8 fruits, of which 4 were situated respectively at 3, 6, 15, 21 inches from its base: the others were borne at somewhat variable intervals on the upper portion of the shoot. The young figs which formed on the shoots of last summer's growth, now the bearing shoots, were all rubbed off last August. The branches were laid in

tolerably thin, and trained some upright, the generality nearly so. There was nothing remarkable in its pruning and training, and therefore I would wish particularly to direct attention to the removal of the young figs which form on the shoots of the current summer's growth previously to the month of August. The utility of this operation has been frequently questioned. At the same time there can be no doubt as to the advanced young figs perishing before the ensuing summer, for they invariably commence doing so at the fall of the leaf—those only surviving which are formed later, and are consequently but little developed. The latter remain enclosed in the bud, about the size of marrow peas, retain their vegetating powers, and wait till the returning flow of sap in spring enables them to proceed to maturity. Yet these are badly situated, almost at the very extremity of the shoot, and consequently on the softest and most immature wood. The reverse of this every one will acknowledge to be a desideratum; and to attain it the only rational mode appears to be the removal of all those early-formed fruits which are too forward to stand the winter, and yet, in our climate, too backward for attaining maturity before cold weather set in. When the blossoms of apples, pears, strawberries, raspberries, &c., are cut off, a second blossoming is induced. The fig manifests the same disposition on its being prevented from nourishing its first-formed fruits. Deprived of its first, it makes an effort to produce a second progeny. The particular period of the season when the shoots require to be stripped of their first formation must be determined by experience, for it is connected with variable circumstances of soil, climate, and situation. As above stated, the operation was performed in August on the tree at Pitmaston; and the results justify the conclusion that it was done at the proper time as regards the condition of that tree.

Apricot trees, trained against walls, are particularly liable to have their stems injured from exposure to the direct rays of the sun. In the angle formed by the border and wall, the heat is often of greater intensity than can be safely borne by the stems of trees, even although these trees have been derived from species naturally growing in hotter climates than this, and where of course the sun's rays are more perpendicular; but it must be recollected that in their natural condition the top forms an umbrella to screen the stems. A seedling apricot tree was in danger from the stem being scorched, and in order to save it Mr. Williams had it surrounded with several courses of bricks about a foot from the stem. The cavity was then filled with soil close to the stem. The tree is now thriving. It produces a small fruit somewhat like the Musch-Musch, but considered superior to it. The parent tree was raised from a stone brought

from Armenia by the late Lord Mountnorris; and the following is an extract of a letter from Mr. Williams respecting it, dated August 6, 1844:—"I mentioned a very early and excellent apricot which I had against a south-east wall, the fruit melting and most excellent, very like in flavour to the Moor Park, but with an agreeable acid mixed with its saccharine quality. With me it has often ripened as early as the 10th of July. It is small in size, but greatly superior to the Early Masculine. The original tree was growing as a standard in Lord Mountnorris's garden, but had not borne fruit when I took buds from it, I think in the year 1821, and budded it against a wall. In the last four or five years large branches have died in succession, and I fear I shall lose the tree. However, I have budded some young plants."

In the same garden an experiment was tried with two Glout Morceau pear-trees grafted on the quince, and allowed to run up with long weak stems, with only a few leaves at top, far too few in proportion to the length of stem. After transplanting against a warm aspect, the roots of both were similarly circumstanced; but the stem of one was for a time frequently syringed, and it lived: the other was not syringed, and it died.

A standard Jargonelle had been grafted on the common white thorn: the latter died, but previously the Jargonelle, having been worked a little under the soil, struck root, and is still existing on its own roots; but the shoots canker, as is usually the case with this sort grown as a standard.

Several green gage plums, worked on stocks raised from apricot stones, appear healthy, and bear well. This being the case, there seems to be no reason why the apricot should not answer well as a stock for its own varieties, in some soils at least.

The Golden Pippin on the Siberian Crab stock was observed to be more healthy than is the case with that variety worked on freer stocks.

Amongst various seedlings, a handsome pear-tree was pointed out which was raised from the Gansel's Bergamot. The leaves were heart-shaped and woolly, resembling those of the parent tree in these respects; but they were not quite so round. The fruit also ripens later than Gansel's; and the tree bears well as a standard. A seedling plum, from the Prune d'Espagne, proves hardy and a good bearer. The stone from which it was raised was brought from Paris by Mr. Williams in 1815. Many varieties of strawberries have been raised at Pitmaston. The Pitmaston Black, described in the 'Horticultural Transactions,' vol. vi. p. 183, fruited for the first time in 1808; but it proved too tender for general cultivation, like all those raised from the Old Black Strawberry, with the exception of the Downton, which

Mr. Knight fortunately obtained by crossing the Old Black with a Scarlet. Many attempts have been made by Mr. Williams to improve the True Chili, which he accomplished to a considerable extent; but the original tenderness of the Chili, as regards cold, is not easily overcome. I would here remark, if the digression may be considered pardonable, that the Chili is likewise too woolly and wants the richness and solidity of the Old Pine, a variety not excelled, nor even equalled hitherto, in these respects; therefore it would follow that the Old Pine is the most proper to employ for crossing the Chili, to gain size and flavour, if the latter has anywhere survived the severe winter of 1837–8. Mr. Williams has an excellent new seedling, which he has named "Vigornia." It has the habit of the pine class of strawberry, and seems robust.

Forced strawberries are often deficient in flavour, and in the case of those forced very early this cannot be easily remedied, especially where the forcing must be conducted so as to suit vines or other things at the same time. When the season is sufficiently advanced, Mr. Williams obtains flavour by ripening off the fruit in the open air. His strawberry plants, prepared for forcing in the usual way, are kept in a cool frame till February; they are then put into a vinery, where they remain till the fruit begins to change colour. At this stage they are removed to the open air, the pots being placed closely together in front of the vinery. Keens' Seedling was the variety thus treated, and the crop was both excellent and abundant. The plan may be advantageously adopted for successional crops, for a supply in May. Syringing strawberries ought to be discontinued when the fruit is ripening off; but whilst water is necessarily withheld, the plants become a nursery for insects sufficient to stock, for the season, vines or other plants that may be in the same house. The removal of the strawberries at the period alluded to is rendered, even on this account, a desirable proceeding.

The vinery was found to possess some peculiarities. It is 32 feet in length, with upright sashes 3½ feet high in front. The back wall forms a partition between the vinery and a coach-room. This room is 10 feet wide, of the same length as the vinery, and has a warm ceiled roof; but the wall between it and the vinery has openings at top, and also near the ground, for the inter-communication of air between the two compartments. By this arrangement superfluous heat, which must otherwise be dissipated in the open air, is economised to a considerable amount. Less fuel is consequently necessary; and provided that a proper degree of temperature and sufficient ventilation are maintained, the less fire-heat the better for vegetation. When the temperature of the vinery rises above that of the room at back, the heated

air flows into the latter by the apertures at top, whilst at the same time the colder air is withdrawn at bottom to an equal extent. Enclosed by non-conducting materials as regards heat, the air in the room would long retain its warmth if entirely shut up. But its store is gradually transferred to the vinery, by the communications existing between them, whenever the temperature of the vinery falls below that of the room. A very simple experiment, the principle of which, I believe, has been often familiarly explained, may be referred to as affording the easiest possible illustration of the mode of action resulting from the above arrangement. Let two close rooms be unequally heated; partially open a door between them, and in the opening place a lighted candle on the ground, whilst another is held near the top; their flames will be deflexed in contrary directions. The lower one will indicate the direction of the current of colder and consequently heavier air, from the cold into the hot room; and the one at top will be seen urged in the opposite direction by the egress of warm air from the hot into the cold, the action continuing till an equilibrium is established in the air of both rooms, which can only be the case when both acquire an equal temperature.

The benefit to be derived from the above principle may be approximately calculated in the case of a vinery, or other forcing-house. Supposing the room to contain as many cubic feet of air as is contained in the vinery with which it is in communication, say 6000 cubic feet in each; supposing also that by sun heat, the air in the vinery rises as much above 70° as will be sufficient to render the whole of the air in both compartments of that temperature, and that the cold at night would reduce the 6000 cubic feet of air under glass from 70° to 40°, it follows that 12,000 cubic feet, the quantity of air in both compartments, will only be reduced half as much, that is to 55°. Again, if the air in a green-house was liable to be cooled down from 50° to 30°, then, in communication with a quantity of air equal to that contained in the green-house alone, and to be also reduced from 50°, the minimum of the green-house would be 40° instead of 30°; and thus, without fire-heat, the plants would be in a comfortable medium. In practice, however, it will doubtless be found that the minimum will be somewhat lower than is indicated by the above calculations, because the inertia of the air interferes with the otherwise free circulation between the respective compartments.

Where the surface of glass is large in comparison with the quantity of air in the interior, the plants are apt to suffer from vicissitudes of temperature, arising from the rapidity with which a small body of air under glass is heated and cooled. A communication with a larger body of air in some adjoining compart-

ment would greatly tend to render the temperature more uniform, and consequently better for vegetation. At all events, recurring to Mr. Williams's vinery, it can be stated that the vines were exceedingly healthy and in a good bearing condition. They were planted 44 years ago inside the house, but their roots have access to the border outside, the front wall being on arches. The house is heated by a brick flue from the fire-place at the east end, running along the front and west end, there terminating in a sheet-iron tube carried up inside. The front portion of the flue has a direct communication with a hinged iron safety-valve to prevent the flue from bursting. The valve is framed in iron, set in the brick-work of the end; it is 8 by 6 inches, terminates the hollow of the front flue, and opens to the external air. Under ordinary circumstances it is kept shut by its own weight; but internal pressure, resulting from the explosion of inflammable gases collected in the flue, would readily open it and permit their escape outwards. Many crops of grapes have been destroyed in consequence of this simple precaution not having been adopted.

More vines had been originally planted in the house than were required to fill it. Sorts which proved not satisfactory were inarched with their preferable neighbours, the tops of the former being then dispensed with, but their roots kept employed. The present branches, in some instances, were thus connected with three distinct root-stocks. In all such cases, one root would have supported branches enough to fill the space of roof allotted for those supported by the three; but then the roots of those sorts not required would have been left to perish in the border; and dead or dying roots of trees are considered to affect injuriously the living roots of the same species that chance to come in contact with them, at least until such time as the decomposition of the decaying roots attains a certain stage. It is true the twigs and leaves of vines prove, for vines, a good manure; but they are parts which are much more easily decomposed into compounds which plants can assimilate, than is the case with roots. Some kinds of the latter have been found, undiminished in size, although dead for many years, a watery, spongy mass which living spongelets seem to dislike. Mr. Williams has the shoots of his vines stopped, first, when they are coming into flower, and again when the berries are of the size of peas.

(*To be continued.*)

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

13. Mr. Fortune's Moutan Pæonies.

One of these flowered in 1847, and has already been mentioned at p. 308 of the Journal for 1847, under the name of *picta*. In the present season several others have blossomed, with the following result:—

1. P. Moutan *atropurpurea;* received April 18, 1846, without a name (numbered 639), and in April, 1845 (Nos. 352 and 320). This proves to be a distinct and very desirable variety, with deep lilac or purple flowers, nearly single, having only a few small petals in the centre. It appears to be quite new. The growth is vigorous. The foliage is deep green, with little red. The petals are from six to eight, deep purple when full blown, but having a decided lilac tint when younger.

2. P. Moutan *salmonea;* received April 18, 1846 (No. 562); as "a very dwarf kind, with flowers as dark as a Tuscany rose." This is a good double, flesh-coloured variety, very much resembling the common Pæonia officinalis *var.*, carnescens, in the flowers, and perhaps not very different from what has been called P. Moutan "*carnea plena*." The outer petals, when fully blown, are a pale salmon colour; the inner have a deep rich tint of the same. The leaves are pale green, with very little red about them. It is a good and distinct variety.

3. P. Moutan *Banksii*. Three plants have turned out nothing more than this old and well-known kind: viz. No. 561, a "blue," received April 18, 1846; Nos. 222 and 224, from Ning Po, received September, 1844.

4. P. Moutan *picta*, No. 351. A sort said to be yellow; received April 18, 1845, is a duplicate of this variety.

5. P. Moutan *parviflora*. Received April, 1845, as a variety from Shanghae (No. 357). In flowers this sort resembles the P. Moutan *rosea*, but is much smaller, and of a very pale rose colour. The flowers are a good double, the centre being filled up with small narrow petals. In foliage it also resembles the Moutan *rosea*, but is a much hardier kind. It is very pretty when first expanded, but loses its distinctness as the flowers fade.

6. P. Moutan *globosa*. Two plants of this came from Shanghae in April, 1845 (Nos. 359 and 362). It is a fine, large, round, white kind, with the base of the petals stained with large blotches

of deep purple. The flowers are perfectly double, but are otherwise those of P. Moutan *papaveracea*. It is one of the finest of Moutans both in size and form.

7. P. Moutan *lilacina*. Received in April, 1845 (No. 353), and in May, 1846 (No. 621), marked "said to be blue." This much resembles the P. Moutan *Banksii* in the form of the flowers and in foliage; but the flowers are more double, and are shaded with a deeper lilac or purple. They are well filled up in the centre with small petals, which are deeper in colour than the outer ones. It is a nice variety, although not strikingly different from P. Moutan *Banksii*.

14. Mr. Fortune's Camellias.

Of the varieties of Camellia received from Mr. Fortune, five plants have now flowered, without producing anything of value. Nos. 684, 584, and 761, received May 8, 1846, under the name of the *Hexangular* variety, so long and vainly sought for, all proved to be the old *myrtle-leaved* sort; as also did No. 743, named the "Star," and described as "a very fine variety of C. hexangularis," received May 8, 1846. No. 341, called Camellia, "fine red," Canton, received April 9, 1845, proved to be a poor, Anemone-flowered variety, with rather small thin flowers, and not worth cultivation. It was in the way of Camellia japonica *atrorubens*.

April, 1848.

15. Thyrsacanthus strictus. *Nees* in *D. C. Prodr.* xi. 324. *Bot. Mag.* t. 4378.—(Th. Lemaireanus, *Nees v. Esenbeck*, in *De Candolle's Prodr.* xi. 729—Eranthemum coccineum, *Lemaire*. Aphelandra longiscapa, Justicia longiracemosa, Salpixantha coccinea, *Hort.*)

Presented by Messrs. Henderson, of Pine-Apple Place, Edgeware Road.

This is a very pretty shrub, with lanceolate, somewhat wavy acuminate, stalked, opposite smooth leaves. The flowers are arranged in short clusters in a naked interrupted slender terminal, downy spike, fully 18 inches long; their corolla is more than an inch long, very deep salmon colour, curved, with a somewhat two-lipped five-lobed limb, the two upper lobes being narrower than the others, and united at their base. The two stamens, with their straw-coloured anthers, are about as long as the upper lip of the corolla.

A stove shrub, requiring the same kind of treatment as Justicias, and easily increased by cuttings. It is a useful plant, as it remains long in bloom.

April, 1848.

16. LONICERA ANGUSTIFOLIA. *Wallich, in DeCandolle's Prodromus*, vol. iv. p. 337.

Raised from seeds received from Captain William Munro from the North of India.

A slender deciduous shrub, with narrow lanceolate ciliated leaves, and small pale yellow flowers, growing in pairs at the end of a slender drooping peduncle, shorter than the leaf to which it is axillary.

This plant grows about 4 or 5 feet high in any good garden

soil, and is easily increased by cuttings. It flowers in April and May, and is not only a distinct, but rather neat-looking plant. Where a choice collection of hardy shrubs is grown it deserves a place.

April 21, 1848.

17. Citrus japonica. *Thunb., Fl. Japonica*, p. 292. *Siebold and Zuccarini, Flora Japonica*, vol. i. p. 35, t. 15, fig. iii.

Received from China, by Mr. Fortune, under the name of the "Kum-quat."

Mr. Fortune has furnished the following memorandum respecting this plant:—

"This species, long known to botanists and to those who have visited Canton, was one of the plants which Mr. Reeves recommended me to send home to the Horticultural Society. In the south of China great quantities of it are grown in pots, and hence it is met with, as a common plant, in the well-known nursery gardens at Fa-tee. It is, however, evidently of a more northern origin, for I met with numerous groves of it on the island of Chusan and elsewhere in that part of China, where it grew in far greater perfection than it does about Canton. It seems also to be largely cultivated in Japan, where it has been seen and described by Japanese travellers, such as Thunberg and Siebold."

"The Kum-quat groves of Chusan are formed on the sides of the lower hills, in those situations where the tea-shrub (Thea viridis) flourishes. The plants are arranged in rows, about four feet apart, and do not attain to a larger size than about six feet in height; from three to six feet is the size which they are usually met with. A small kind of orange is also found in these groves; but good oranges, such as those known in the south as 'Mandarins' and 'Coolies,' are entirely unknown; indeed, the Chusan winters would be far too cold for them. This shows, therefore, that the Kum-quat is of a much hardier nature than any of the plants belonging to the orange tribe with which we are acquainted in gardens."

"The fruit ripens late in the autumn, being then about the size of a large oval gooseberry, having a sweet rind and a sharp acid pulp. It is largely used by the Chinese as a preserve, and very frequently finds its way to England as presents to those who have friends in China. Preserved in sugar, according to the Chinese method, it is excellent."

"In China the Kum-quat is propagated by grafting on a prickly wild species of Citrus, which seems of a more hardy nature than the Kum-quat itself. This fact should be kept in

mind when the plant is increased in this country, otherwise we shall have a comparatively hardy plant growing on a tender one.

We have no experience yet as to the fitness of this plant for our climate; but if not quite hardy about London, it is likely to prove so in such counties as Cornwall and Devonshire, or in the south of Ireland. It is well worth a trial in those districts, for if it would succeed as it does in the island of Chusan, it would be a striking and beautiful object. The Kum-quat groves on that island were amongst the prettiest sights which came under my notice, particularly when the fruit was ripe, hanging in profusion over the bushes, and contrasting so well with the clear green foliage."

The plant, as cultivated in the Society's Garden, resembles a dwarf small-flowered orange tree, with thinner, smaller, and narrower leaves. Its fruit is as Mr. Fortune describes it, but its bright orange rind is not very fragrant until it is cut or scraped, when it becomes highly agreeable. It is not much thicker than the skin of a gooseberry, and contains five cells, filled with a very acid pulp, resembling that of the "Lime." It will no doubt make an excellent preserve.

According to Siebold, the species, which is cultivated by the Japanese, acquires the height of from five to eight feet, and

forms a close round head, raised a few feet above the ground. He describes both this and a sort with a spherical fruit, and says that the fruit and rind eaten together are very agreeable, adding, however, that they leave a burning aftertaste. It is too acid for an English palate. *April*, 1848.

18. ZAUSCHNERIA CALIFORNICA. *Presl. in Reliquiæ Hænkeanæ*, vol. ii. p. 28, t. 52.

Raised from seeds, collected by Mr. Hartweg, in fields about Santa Cruz, in California, and received at the Garden, May 11th, 1847.

This curious plant, which it has so long been an object to obtain, proves to be a species of much horticultural interest. It forms a bushy perennial, about three feet high, clothed with ovate, sessile, toothed leaves, resembling those of a Gaura. Every branch emits from the axils of all the upper leaves one horizontal bright scarlet flower, about an inch and a half long. Its general appearance is not unlike that of a Fuchsia, but the calyx tube has four stout ribs. The petals, which are inversely heart-shaped, spread flat; the eight stamens, with red anthers and a red four-lobed stigma, project beyond the flower.

The plant grows freely in good garden soil, and is easily increased by cuttings or seeds. The seedlings flower in the first season, in the month of September, if sown in May. It is a very fine hardy perennial, rivalling the Fuchsia, and most probably will flower from June to October, if planted in a warm dry situation on rockwork.

September, 1847.

19. Calceolaria cuneiformis. *Ruiz and Pavon*, *Flora Peruviana*, vol. i. t. 27; f. *b*.

Raised from seeds purchased from Mr. Thomas Bridges in 1846, and said to be from Bolivia.

This in its wild state is a stiff short-branched bush, with small wedge-shaped leaves covered with white hairs on the under side. It bears 2 or 3 flowers at the end of each branch, which is closely covered with short rough hairs. In its cultivated state it has much larger and softer leaves, and weaker branches. The flowers are about as large as those of Calceolaria integrifolia, and of a pale lemon colour.

It is a very pretty greenhouse shrub, with a better habit than the old shrubby Calceolarias.

Oct. 7, 1847.

20. Angelonia angustifolia. *Bentham in De Cand. Prodr.* 10, 254.

Raised from seeds received from Mexico from Mr. Hartweg, in January, 1846.

Perfectly smooth in all its parts, very upright, and about two feet high. Leaves opposite, narrow, tapering somewhat to the base, slightly and distantly serrated. Racemes terminal, erect,

Angelonia angustifolia.

densely many-flowered, nearly six inches long. Flowers deep violet, with a green throat, a small double tooth within the cavity, and two gibbosities at the back.

This is a half-shrubby stove perennial, which grows freely in a mixture of loam, leaf-mould, and sandy peat, in equal proportions, with plenty of moisture. It is easily increased by cuttings, and flowers from June to October, but afterwards should be kept rather dry, particularly during winter.

It is a very handsome little plant, and one deserving a place in every stove or warm greenhouse.

June 19, 1847.

21. ACACIA IXIOPHYLLA. *Bentham, in London Journal of Botany*, i. 364.

Raised from seeds presented to the Society by Dr. Henderson from New South Wales, December 5, 1844.

A straggling bush, remarkable for the large quantity of viscid glands and hairs which cover its branches. The leaves, or phyllodes, are narrow, blunt, shining, with from three to five faint longitudinal anastomosing veins on each side. The flowers are sweet scented, in small yellow heads, seated on short hairy stalks in the axils of the phyllodes.

It is a hardy greenhouse small shrub, thriving in any good rich loamy soil, and flowering freely in March. It is propagated best by seeds, but may be increased by cuttings in the ordinary way.

It is a very pretty and desirable kind of Acacia, on account of its dwarf bushy habit and profuse blooms.

March 11, 1848.

22. SERICOGRAPHIS GHIESBREGHTIANA. *De Cand., Prodr.* xi. 730.

Presented to the Society by Mr. J. A. Henderson, F.H.S., of Pineapple-place, in April, 1847.

A half-herbaceous shrub, with smooth stems, and dark-green oblong lanceolate leaves. The flowers are arranged in small, loose, one-sided and downy panicles, and are sessile on the side branches which bear them. The calyx is hairy, and divided into five very narrow leaves. The tubular corolla is about an inch and a half long, bright purplish red, with a two-lipped mouth, of which the lobes are nearly equal, the upper being two-toothed, the lower three-toothed.

It requires the same treatment as Justicias, and similar soft-wooded stove plants. It is easily increased by cuttings, and flowers freely in October, November, and December.

It must be regarded as a very handsome winter flowering stove shrub, remaining a long time in bloom. Its bright scarlet flowers make it very desirable in winter.

Dec. 18, 1847.

23. AMYGDALUS PERSICA. *Sanguinea plena.*

Received from Mr. Fortune, as a "Peach, flowers double red."

This is a semi-double variety of the Peach, with dark crimson flowers, and quite hardy. It is a very fine and handsome plant.

April 12, 1848.

24. BOUVARDIA CAVANILLESII. *De Candolle, Prodromus*, vol. iv. p. 366.

Raised from seeds received from Mr. Hartweg in January,

1846, from Mexico, as a species of Bouvardia, with "scarlet and yellow flowers."

A hairy bright green shrub, with short-stalked ovate leaves, intermediate three-toothed stipules, and scarlet tubular smooth flowers nearly an inch and a half long. The segments of the corolla are very sharp, and spread flat when fully expanded. In a wild state it forms a stiff bush, with short lateral upright arms, having about 9 flowers at the end of each. In cultivation it is about as graceful as a Fuchsia macrostema.

It is a small greenhouse shrub, requiring the same kind of treatment and soil as the old Bouvardia triphylla, and freely producing its flowers from the old wood, if rather stunted. It should be kept nearly dry all the winter. It is handsome when not overgrown and old, and flowers all the summer and autumn.

June 7, 1848.

25. Viburnum dilatatum. *Thunb., Fl. Japonica*, p. 124.

Received from Mr. Fortune, on his return from China, in May, 1846; said to have been collected at Tein-tung near Ning-po, in May, 1844.

This is a small shrub, with the appearance of V. dentatum. It has bright-green plaited leaves, with a few rough hairs on both sides, and on the young wood, and a regular coarse toothing at the edge. The flowers are in small spreading cymes, white, and destitute of all tendency to acquire the radiant condition of the Gueldres rose and its allies.

It grows freely in any good garden soil, and is easily increased by cuttings of the half-ripened shoots. It is of little importance except in a collection, as the flower-heads are not showy.

May, 1848.

26. Mussænda macrophylla. *Wallich, in Roxburgh's Flora Indica*, vol. ii. p. 228.

Received from Messrs. Knight and Perry, Nurserymen, King's Road, Chelsea, in July, 1845.

The branches of this plant are covered with coarse reddish hairs; the leaves also are hairy, ovate-oblong, acute, with bifid red-edged reflexed stipules. The flowers grow in small close heads, and are hairy like the leaves. The divisions of the calyx are ovate-oblong, stunted, and red-edged, with the exception of one which has a long stalk, is the form and size of the ordinary foliage, and has a chalky white colour a little enlivened by a few

green veins. The corolla is larger than the calyx, deep yellow, with roundish shallow lobes.

It is a rather large stove shrub, growing freely in a mixture of sandy peat and loam in equal parts. It flowers during the summer and autumn, and is easily increased by cuttings of the young wood in the ordinary way. It requires plenty of room, otherwise it is not ornamental.

June, 1847.

ORIGINAL COMMUNICATIONS.

XXVI.—*Contributions to a History of the Relation between Climate and Vegetation in various parts of the Globe.*

No. 8.—*The Vegetation of the Diamond and Gold districts, in the Province of Minas Geraes, in Brazil.* By George Gardner, F.L.S., Director of the Royal Botanic Gardens, Ceylon.

After crossing the head waters of the Rio Carynhenha, a small river which divides the provinces of Pernambuco and Minas Geraes from each other, we traversed the arid and uninhabited Serra das Araras, and following eastward the course of the Rio Urucuya, we reached the Villa de San Romaõ, which is situated on the west bank of the great Rio de San Francisco. After crossing the Serra Geral, and gaining the low country to the east of it, we found that its general character was very similar to that on the west. The trees consisted of the *Curatella Cambaiba*, St. Hil., *Salvertia convallariodora*, St. Hil., two species of arboreous *Bignonia*, with yellow flowers, a *Commilobium*, a fine *Gerascanthus*, a *Bombax*, and a simple leaved *Rhopala*. About a fortnight was spent in San Romaõ, to recruit both ourselves and the horses; and in packing up my Goyaz collections, amounting to upwards of 1400 species. The country around the villa was too much burned up by the drought to afford much scope for botanizing, nevertheless several new things were obtained. Another journey of about a month brought us to the Cidade Diamantina, the capital of the Diamond district. The flat country which lies between the high mountains of this tract and the Rio de Sañ Francisco is arid in the extreme; much of it, particularly in the dry season, being little better than a desert. Indeed, the name given to it, and to all others of a similar nature by the Brazilians, viz. *Sertaõ*, means a desert. It is of an undulating nature, intersected by a few low mountain ranges, and for the most part covered with *Catinga* forests, and occasional marshy Campos containing a few large *Buriti Palms*. The more elevated of the Campos are dry, and have a few small trees scattered upon them. It was the height of the dry season when we passed through this dreary tract, suffering by day from a burning sun, and by night from the attacks of a species of tick, which had indeed annoyed us ever since we left Arrayas. They exist everywhere among the herbage and bushes, clustered together in little balls, ready to fall upon the first person or animal that passes. They fix themselves by their proboscis to

the skin, where they remain, if not picked off, till they reach the size of a small bean. At night we often found ourselves covered by thousands of these creatures, and to get rid of them had to wash our bodies with an infusion of tobacco. The *Sertaõ* is but thinly inhabited. During the season of the rains the aspect of it is completely changed, the *Catinga* forests being then covered with leaves and flowers, and the ground with a profusion of herbaceous plants. It is only during the few months when this state of things exists, that this region is a desirable one to live in. After passing the Villa de Formigas the country began to rise, producing not only a cooler climate, but a much more varied vegetation. On a high uninhabited serra, which took us two days to pass over, I made a splendid collection of plants, it being one of the richest fields I had been in since leaving the Organ Mountains. So numerous, so beautiful, and so different in character were the numerous shrubs and herbaceous plants, for there were almost no trees, which grew on this range, causing it more to resemble a botanic garden on a mighty scale than a wild mountain top seldom trodden by the foot of man, that I knew not what to grasp at first. In some places grew large patches of *Lychnophoras*, curious pine-looking shrubby *Composites*, peculiar to the elevated mountains of the interior of Brazil; in others the most beautiful species of *Melastomaceæ*, with small heath-like leaves, and large flowers of almost every colour. Above these rose two or three different kinds of *Virgularia*, with rose-coloured blossoms, and a tall woolly-leaved *Senecio*, bearing large corymbs of yellow flowers. We slept all night in a sandy field on the top of the mountain, full of a beautiful suffruticose Lupin (*Lupinus arenarius*, Gardn.) with simple leaves and long spikes of purple flowers. Here also grew the beautiful scarlet-flowered *Lisianthus pulcherrimus*, Mart., and a host of most remarkable *Eriocaulons*, some of which I have published figures and descriptions of in Hooker's *Icones Plantarum*. During my travels in Brazil I collected of this genus alone upwards of one hundred species. But very few of them have any resemblance to our own solitary species, *E. septangulare*. A great number of them are large suffruticose plants, often attaining a height of from four to six feet and upwards; very much branched, and the branchlets terminated by a large white ball made up of a vast number of smaller heads, placed on peduncles of unequal length. Another remarkable circumstance connected with these strange plants is the fact, that by far the greater number of the Brazilian species do not inhabit the water as our native one does, but the dry and often arid parts of mountain declivities. Many also grow and flower in parched flat sandy places which in the wet season have

been a little flooded. The truly aquatic Brazilian kinds are those which, more or less, resemble our own in habit. Another charming shrub which I met with here was a species of the beautiful genus *Physocalyx*, which belongs to the *Scrophulariaceæ*, and has large inflated scarlet calyxes. *Composites* both shrubby and herbaceous were exceedingly abundant, and several small kinds of *Vellozia* and *Barbacenia*, but almost all out of flower, grew on rocky declivities. The only Orchideous plants met with were two species of *Lælia* growing on bare rocky places, one with yellow, the other with purple blossoms. Descending from this serra, we again entered a flat country, but considerably elevated above the *Sertaõ* to the west, and a journey of five days brought us to Mendanha, a little village on the banks of the Rio Jiquitinhonha, which is famous for the diamonds that are found in it. Two days more brought us to the Cidade Diamantina itself. Immediately on leaving Mendanha, we ascended a high serra by a good but very steep path, by the sides of which I found many novelties, among which may be mentioned the following:—three curious kinds of *Eriocaulon*, one of them a remarkable branched one, which I have made the type of a new genus (*Cladocaulon*), two species of *Diplusodon*, several fine *Melastomaceæ* and *Compositæ*, a *Piper* with long spikes and very large leaves, a *Humirium*, *Lavradia montana*, Mart., a pretty little shrub belonging to the natural order *Violets*, a simple-leaved *Lupin*, a leafless *Phyllanthus*, a beautiful scarlet-flowered *Andromeda*, a *Vaccinium*, a *Rubus*, a *Physocalyx*, &c. From the top of this ascent to the city the country is a flat elevated table-land, the Serra de Itambé rising to a great height above it, surrounded by numerous lower ones, all as bare and arid as the mountains in the highlands of Scotland.

A residence of about three weeks in the Diamond country enabled me to make large additions to my Herbarium. Various excursions were made in all directions to the valleys, the ravines, and the mountain tops, every one of them yielding desirable acquisitions. The more remarkable of these were as follows:—a beautiful *Luxemburgia*, several purple-flowered *Vellozias*, one of them a stemless species with narrow leaves, very much resembling *Crocus vernus*, *Diplusodon rotundifolius*, and another narrow-leaved species, two kinds of *Lupin*, one of them a fine shrub about six feet high, with small silky entire leaves and short spikes of blue flowers (*Lupinus parvifolius*, Gardn.), two species of *Angelonia*, one of them a suffruticose plant with very large flowers, numerous *Melastomaceæ*, the *Lavoisierias* and *Marcetias* being particularly handsome from their elegant habit, small leaves, and large flowers, of many colours, but rose is the most common; several *Barbacenias*, a few curious

Eriocaulons, several *Ferns*, one of them a fine *Cassebeera* (*C. gleichenioides*, Gardn.), a slender *Wahlenbergia*, the only *Campanulaceous* plant I met with during the whole of my travels in Brazil; numerous species of *Vaccinium*, or rather *Gaylussacias*, one of them a truly splendid plant with long crimson flowers; two species of *Physocalyx*, on bare rocks; abundance of the purple-flowered Lælia, which I previously met with, two species of *Rubus*, a *Kielmeyera*, a *Vochysia*, numerous *Composites*, such as *Vernonias*, various remarkable kinds of erect *Mikania*, several of *Baccharis*, *Trixis*, *Albertinia*, the strange *Lychnocephalus tomentosus*, Mart., and many kinds of *Lychnophora*. These latter, together with the Vellozias, are so abundant and so peculiar in habit, that they give quite a character to the Diamond country. The *Vellozias* were well named by Martius when he called them tree-lilies. They vary very much in size, often reaching to the height of twelve feet and upwards. The large ones are not unlike screw-pines in habit. Their stems, which are little more than a loose tissue of roots, and which show beautifully the plan upon which all stems are formed, rise several feet before they branch, and when they do so it is in a dichotomous manner. They are destitute of leaves, except at the ends of the branches, where a long tuft of them exists. The flowers spring out of the centre of these, and are thrown free of the leaves by being borne upon a long peduncle. The flowers of the larger species are about six inches long, and in shape not unlike those of *Lilium candidum*. Seldom have I seen an object more beautiful than one of these when in full bloom. I was the first to introduce this genus to the hothouses of England, but as they were raised from seeds, and as they are but slow of growth, and impatient of cultivation, it may reasonably be supposed that they will be a long time before exhibiting the beauty of their wild progenitors. The soil in which they grow in their native country is generally of a ferruginous gravelly nature, and well drained; and the climate is one of the *clearest* and *coolest* in tropical Brazil. Those which I collected near the Cidade Diamantina, as well as all the other plants I have mentioned, were found where the thermometer ranged from 54° to 60° Fahr. The only trees in the vicinity of the city are cultivated ones, and the most handsome of them all was the noble *Araucaria Braziliensis*, some of which must have been about sixty or seventy feet high. I was particularly struck with two plants, which grew profusely in most places, and by roadsides round the city—two exiles from Europe, *Urtica urens*, Linn., and *Arctium Lappa*, Linn. The time may come, when Brazil has botanists of her own, that they will claim these as true denizens of their soil, in the same manner that some of the

would-be botanists of England are claiming for her more than is legitimately hers.

Leaving the Cidade Diamantina, and passing along the top of the Serro do Frio (an elevated table-land similar to that between the city and Mendanha, but more undulating), a journey of about twelve days brought us to Cocaes, one of the English gold mines. The first part of the journey was through a cold arid-looking country, wooded only a little in the hollows, and very thinly inhabited. Nevertheless it proved a rich field for my researches, and I added many beautiful subalpine shrubs and herbaceous plants to my collections. Among these may be mentioned various species of *Lychnophora*, *Vellozia*, *Barbacenia*, *Andromeda*, *Physocalyx*, *Albertinia*, *Vernonia*, *Luxemburgia*, beautiful *Melastomaceæ*, *Larradias*; numerous *Eriocaulons*, a few *Begonias*, a fine terrestrial *Epidendrum*, several herbaceous *Composites*. The country between the Serro do Frio and Cocaes is lower than the Serra itself, but of the same undulating nature. The woods are mostly in the hollows, forming round clumps, called *Capoẽs*, an Indian name which signifies Islands, a term well applied to these isolated patches of trees. The hills are either covered with *Pteris caudata*, a rank *fern*, very much resembling our own *Pteris aquilina*, and a great pest to the agriculturists, or by a low compact-growing grass, which, from a slightly glutinous matter that exudes from it, is called *Caapim gordura* (*Melinis minutiflora*, Pal. de Beauv.). Although this grass is now one of the most abundant gregarious ones in Minas, there are great reasons for suspecting that it is not indigenous to the soil. It is well named an ambitious grass by St. Hilaire, for it soon destroys all other herbaceous vegetation by usurping its place. Its progress northwards has been observed by the inhabitants to be very rapid; the seeds, which are small and glutinous, being easily transported either by man or animals. On the Serra Geral, between Minas and Goyaz, I met with a few plants of it; and there can be no doubt that ere many years it will there, as in Minas, become one of the most common grasses. Cattle are fond of it, but it is said not to fatten them. One of the finest plants collected in this low country was a climbing *Mutisia* (*M. campanulata*, Less.); and the most remarkable, considering the natural order to which it belongs (*Labiates*), a *Hyptis*, which was one of the largest trees in the woods, being upwards of fifty feet high, and with a stem about three feet in circumference. Many *Vernonias* of equal size are to be met with in the Gold District. I remained altogether about six weeks in mining districts, making the mine of Morro Velho my head-quarters during the greater part of that time. Excursions were made in many directions, and many no-

velties collected, especially on the mountains. Between the higher mountain ranges, the country in this district is a beautiful diversified one of hill and dale. The rounded hills are covered with pastures, sometimes thinly wooded with small trees, and beautiful flowering shrubs, intersected by small streams of limpid water; and in the hollows exist those patches of wood already mentioned under the name of *Capoẽs*. My longest journey was to the summit of the Serra de Piedade, the highest in Minas, with the exception of one in the Diamond district, but which I did not visit; and a list of the plants which I met with on the way to it, and on its ascent and summit, will give a tolerable idea of the nature of the vegetation of this delightful region. It was unfortunately the end of the dry season when I arrived here, and consequently the time at which the fewest number of plants of all kinds are in flower. The rocks of this part of the country consist of primitive clay-slates, and micaceous schists, highly impregnated with iron—so rich, indeed, that in many places they yield as much as from 60 to 90 per cent. of the pure metal. The soil is in consequence of a very ferruginous nature. The small trees that grow on the open hilly campos are chiefly species of *Styrax*, *Luhea*, *Kielmeyera*, *Myrtaceæ*, *Melastomaceæ*, *Compositæ*, *Palicourea*, *Vochysia*, *Qualea*, *Hirtella*, &c. The shrubs here are *Luxemburgias*, *Andromedas*, numerous *Compositæ*, *Diplusodons*, *Lantanas*, *Lippias*, *Hyptides*, *Melastomaceæ*, &c.; and the herbaceous plants species of *Lisianthus*, *Callopisma*, *Phyllanthus*, *Declieuxia*, *Gramineæ*, *Eriocaulon*, &c. The trees in the *Capoẽs* consist chiefly of *Myrcia*, *Eugenia*, *Vochysia*, *Inga*, *Weinmannia*, *Uvaria*, *Anona*, *Styrax*, *Coccoloba*, *Bauhinia*, *Laurus*, &c. The first part of the ascent of the serra I found covered with a gregarious species of *Baccharis*, and another of *Lychnophora*, while the grassless stony surface of the ground was covered with numerous *Orchideæ*, one of them the beautiful yellow *Lælia* which I first met with in the Diamond country, and a very prickly procumbent species of *Cereus*, while intermingled with these grew numerous large water-bearing *Tillandsias*. At a greater elevation a yellow-flowered *Cassia*, about three feet high, was very common, as also various species of *Gaylussacia*, a *Gaultheria*, several *Malpighiaceous* shrubs, a fine dwarf *Styrax*, a small variety of *Drymis Granatensis*, numerous Orchideæ, but few of them in flower, a few *Ferns*, *Mosses*, and *Lupins*.

The upper part of the mountain is arid and rocky, the hollows containing a few *Melastomaceous* shrubs, and the rocks themselves covered with Lichens, and numerous small kinds of *Orchideæ*, such as species of *Stelis*, *Pleurothallis*, &c. Near the summit there is a small church, which is kept by an old Mu-

latto woman, and a dirty old man who calls himself a hermit. Near this church there is a small garden, in which I observed a few stunted peach-trees in blossom, some potatoes, and other European vegetables. The greater part of the garden, as well as part of the top of the serra, is overrun with the common wild strawberry of Europe (*Fragaria vesca*), which was then in fruit. The common chickweed and *Cerastium vulgatum* were also perfectly naturalized in places suited to their growth. The height of this mountain is 5400 feet above the level of the sea, and it is situated in nearly 20° of south latitude, and 44° 40′′ of west longitude. Notwithstanding the height of this mountain, I neither found it so rich in species, nor the regions of vegetation so well marked, as on a much lower one called the Serra de Curral del Rey, near Morro Velho. It is at least 2000 feet lower than the Serra de Piedade. Four very distinct regions may here be traced: the *first* or lowest resembles exactly the low grassy hills which surround it, the vegetation consisting chiefly of small *Melastomaceous* shrubs, *Lantanas*, *Lippias*, different kinds of *Baccharis* and *Vernonia*, *Laurus*, *Myrtaceæ*, &c. The *second* region is still grassy, but characterized by a very different shrubby vegetation. Here are met with two species of *Andromeda*, one of them very abundant, and producing large panicles of crimson flowers, one or two fine plants of which have been raised by Mr. Murray, of the Glasgow Botanic Gardens, from seeds sent home by me; and the other a small tree about eight feet high, with white flowers; two erect species of *Trixis*, a purple-flowered *Diplusodon*, a dwarf *Kielmeyera*, a small purple-flowered *Jacaranda*, an erect *Bignonia*, with yellow flowers, &c. The soil of the *third* region is of a coarse stony ferruginous nature, entirely destitute of grass; and is characterized by the following plants:—a *Myrcia*, a *Loranthus*, with pale yellow sweet-smelling flowers, rooting in the earth, but climbing among the bushes, being the only species of the many I have met with in Brazil which is not parasitical, a *Lychnophora* similar to the one found on the Serra de Piedade, abundance of a dwarf kind of *Vellozia*, a yellow-flowered *Barbacenia*, and the ground and rocks were covered with numerous kinds of *Orchideæ* and *Tillandsiæ*, and a red-flowered species of *Amaryllis*. From the termination of this region to the top of the serra, constituting the *fourth* region, the soil is again covered with grass. Shrubs are less abundant, their place being taken by two species of *Vellozia*, one of them about six feet high, with a stem upwards of two feet in circumference, bearing large purple flowers, the other much smaller. On the stems and branches of the large one, I found several species of Lichen, Moss, and two species of *Epidendrum*. Among

these *Vellozias* grew a species of *Physocalyx*, a fruticose kind of *Siphocampylos*, a small white-flowered *Vaccinium*, a *Vernonia*, two or three small species of *Melastomaceæ*, and on the summit a beautiful little *Barbacenia*, with large red flowers, and a few small species of *Eriocaulon*.

After leaving Morro Velho I visited the cities of Marianna and Ouro Preto, the country round which is very similar to that I have just described; and here again many fine plants were added to my herbarium. Finally leaving the mining districts early in the month of October, and travelling slowly through the forest country which intervenes between them and the coast, a journey of a little less than a month brought me a second time to Rio de Janeiro, having been absent from it upwards of three years. There being no opportunity of getting any of my packages sent to the coast after leaving the city of Oeiras, I was obliged to bring all my enormous collections along with me. These ultimately required about twenty mules to carry them. Three months were spent in Rio, arranging part of these to send home, and three months more in a second visit to the Organ Mountains, partly to recruit my health, which had suffered a good deal from the fatigues and anxieties which always attend such a lengthened journey as the one I had just completed, and partly to make a collection of living plants to take home along with me. On my return to Rio, I had only a few days to prepare for returning to England; and, early in May, embarked in a ship bound for Liverpool, viâ Maranham, in the north of Brazil. At the latter place we remained about three weeks; and although the general character of the country is very similar to that of the maritime parts of the province of Ceará, the vegetation is somewhat different, and enabled me to add considerably to my stores. The shores of Brazil were finally left on the 10th of June, and I arrived safely at Liverpool with all my collections on the 11th of July, 1841, having been absent five years and two months. It was a source of no little satisfaction to myself, as well as to those who participated in my collections of dried plants, amounting to about 7000 species, that they all arrived in the most perfect state in this country.

Before concluding these necessarily very brief sketches of the vegetation of such parts of the immense empire of Brazil as I have myself visited, I purpose giving an outline of the views of Von Martius on the general regions of vegetation into which the whole of Brazil may be divided, and which, I trust, will not prove unacceptable to those who are interested, not only in the rich flora of that country, but in the geographical distribution of plants generally. The paper in which this learned and accomplished naturalist has exposed his views on the subject is in the

second volume of the *Flora, oder Allgemeine Botanische Zeitung* for the year 1837; and a translation of it has been published by Sir W. Hooker in the fourth volume of his *Journal of Botany*. The regions which he establishes are five in number, viz.:—

1. Regio Extra-Tropica.—This region includes all that plain or gently undulating country extending between the southern tropic and Monte-Video. The northern parts of it are the highest, and the mountains there are covered with forests, some of which consist entirely of the *Araucaria Braziliensis*. Further south the country becomes lower, and the forests more rare, and mingled with the American are to be found European forms of vegetation. To the plants of this region Martius gives the name of *Napææ*.

2. Regio Montano-Campestris.—This region includes the great Brazilian mountain system, which constitutes the interior of the province of Minas Geraes to the west, as also part of the provinces of Rio de Janeiro, Sañ Paulo, Goyaz, Matto Grosso, and Bahia. The vegetation of this region is that which I have described as existing on the Serra do Duro, and the Serra Geral, in the province of Bahia, and that of the mountains in the Gold and Diamond districts. To the plants peculiar to this region Martius gives the name of *Oreades*.

3. Regio Montano-Nemorosa.—This region includes the mountain forest tracts. To it especially belongs the cordillera of the coast, called Serro do Mar, extending from the province of Sañ Paulo to Bahia, and northerly from it to the other side of the Rio de Sañ Francisco, in the provinces of Alagoas and Pernambuco. The southern flora of this region is somewhat different from that of the north on account of the greater height of the mountains and more humid atmosphere; but they have, notwithstanding, in their physiognomy, corresponding forms. This of course includes the Organ Mountains, as well as the other mountains in the province of Rio, the vegetation of which is distinguished above all others by greater magnificence in form and colour. This region passes into the Extra-tropical one on the south, to the Montano-campestris on the west, and in the north merges into the *Catinga* forests of the northern provinces. To the plants of this region is given the name of *Dryades*.

4. Regio Calido-Sicca.—This region includes all those tracts of country which in Brazil are called by the name of *sertaõ*, which literally signifies *desert*. It is the most thinly inhabited, and embraces that part of the province of Minas which lies between the mountains of the Gold and Diamond districts and the Rio de Sañ Francisco, as well as part of that which extends up to the Serra Geral towards Goyaz. It likewise includes the interior of the province of Bahia, the south-western part of the province of Pernambuco, and the valley of the province of

Piauhý, as well as that of Goyaz, and the whole of Rio Grande do Norte, Ceará, and parts of Maranham and Para, particularly their southern portions. To the plants which grow in this region Martius gives the name of *Hamadryades*.

5. Regio Calido-Humida.—The country which stretches northerly from the province of Ceará declines towards the great plain of the Amazon. The low mountains consist of sandstone belonging to the chalk formation, and the country abounds in springs, streams, rivers, and lakes; frequent rains continuing to fall through the greater portion of the year, and moisture during the latter part of it, brought by the winds from the Atlantic Ocean, all here unite in producing the greatest vigour and luxuriance of the vegetation. Dry situations are scarcely to be met with, except on the sides of some of the low hills in the interior of this almost wholly unexplored tract, which stretches between the Atlantic and the Rio Madeira. Lofty forests, intricate and wild, but never so grand or so beautiful as those of the south-eastern parts of the empire, cover by far the greater part of it. Pasturage is chiefly found on the hilly lowlands, seldom on the mountains as in Minas. To the north it is bounded by the Paramé range, and to the west by the ramifications of the Andes. The whole of the vast tract of country which this region includes has hitherto scarcely been examined, so that a rich field still remains for those who may venture into it. To the plants peculiar to it Martius gives the name of *Niades*.

Such, then, are the regions which Martius has proposed to include the entire vegetation of Brazil. There are, however, certain plants which extend over many or all the regions. The *Dryades* and *Hamadryades*, for example, appear throughout the whole extent of the tropics; and, in like manner, many of the trees that belong to the *Regio Nemorosa* and the *Regio Calido-sicca*. Many herbaceous plants are also equally generally distributed. To these widely-extended plants Martius gives the name of *Vagæ;* and many of these, he observes, belong to the northern tropical forms of Eastern South America, or the Flora of the Orinoco district; whilst those of the *Regio Extra-Tropica* ought to be reckoned to belong, not to Brazil, but to the Flora of Buenos Ayres, Tucuman, or that of the Cis-andine extra-tropical empire.

XXVII.—*The Dwarf Cocoa-Nut of Ceylon.* Note by the Vice-Secretary.

It having been made known to the Council of the Horticultural Society that there exists, on the coast of Ceylon, a race of pigmy Cocoa-nut trees, means were sought for introducing it

into cultivation in England. The appointment of Mr. Gardner to the charge of the Botanical Garden in Ceylon having appeared to offer a favourable opportunity, the good offices of that gentleman were sought and secured. Some delay however arose from unavoidable circumstances; but at length, on the 13th of April, Mr. Gardner announced the despatch of some nuts, with the following remarks:—

"In the other box there are eight nuts of the dwarf Jaffna cocoa-nut. There are two varieties: those on which a cross is cut are of a green colour when ripe, while the others are bright orange. They produce fruit at Jaffna when they are about three years old, and while the stem is only from two to three feet high, and I have no doubt you will be able to fruit them at the Horticultural Society's Gardens. Should you like to have more of them, let me know, as I have an excellent friend at Jaffna who will send me more. When planted they should only be half-buried flatways, and the best soil for them is two-thirds sand to one of vegetable mould, into which a few handfuls of wood ashes and salt should be thrown. The pots should be roomy and well drained."

These nuts have been received safely and in good order; and it is hoped that they may lead to the acquisition of a plant which would certainly be an important addition to the Palm Trees cultivated in this country.

XXVIII.—*On the Pot Culture of the Genus Gladiolus.* By James Duncan, C.M.H.S., Gardener to Joseph Martineau, Esq., F.H.S., Basing Park, Alton.

(Received May 14, 1848.)

Few plants are more beautiful or better adapted for ornamenting the drawing-room and conservatory for a lengthened period than some of the varieties of the genus Gladiolus. I have for several years cultivated many of the sorts, but more especially the G. insignis, byzantinus, and cardinalis; and, certainly, the brilliant display of flowers they produce will amply compensate for any trouble that may be taken in their cultivation.

The last week in September is the time I usually repot them, using pots of various sizes from five inches to a foot in diameter, in order the more readily to adapt them to ornamental pots, vases, or stands, as future circumstances may require. The soil I have found well suited to their growth is composed of yellow fibrous loam and turfy peat of equal quantities, with the addition of a little silver sand and leaf mould, using it in a tolerably rough condition over a thorough drainage. The number of bulbs placed in each pot is regulated by their size, the largest

pots usually producing from fifteen to twenty spikes of the most fascinating colours; and whether placed on stands amongst the foliage of the conservatory plants, or plunged in vases or baskets of moss and lichen, the effect is gorgeous and pleasing. Liquid manure is frequently administered during the period of growth, and when the plants have done flowering they are removed to the open air for the purpose of perfecting the process of vegetation. So soon as the foliage shows symptoms of decay water is gradually withheld, and the pots are finally laid on their sides in a shady situation, in order to moderate the action of light and moisture on the roots whilst in a state of repose.

XXIX.—*On the Formation of Vine-Borders.* By G. Fleming, C.M.H.S., Gardener to the Duke of Sutherland, F.H.S., at Trentham.

(Communicated August 1, 1848.)

Knowing the great disappointment which has been experienced in forming vine-borders for early spring forcing, I beg to give a plan and description of one which I have found to answer admirably, hoping that it may prove interesting and serviceable to some of your readers.

I shall begin by premising that, in order to secure a good crop of well-coloured highly flavoured grapes in the latter end of February and the month of March, it is necessary to have the vines thoroughly established in a border containing a substantial but not over rich soil, and which is placed under perfect control as regards heat and moisture, a thing absolutely indispensable to ensure success.

It will scarcely be necessary to enforce the truth of this assumption by argument, as it is unreasonable to expect that a healthy co-operation will go on between the roots and branches if the former are confined in a border exposed to the cold and wet of our winter months, and the latter surrounded by the warm moist atmosphere of a forcing-house.

In order to secure a proper amount of warmth in the soil, and to prevent an excess of moisture in cold situations, all communication with the subsoil should be cut off, the surface should be protected from rain and snow by some covering which may be easily and speedily removed, and the necessary amount of heat should be supplied from beneath. This is much more effectual as well as more economical than when it is applied to the surface: in this case, heat having a natural tendency to ascend, it rises into the soil and distributes itself amongst the roots; in the other a great portion of it escapes into the atmosphere and is lost.

It will be my endeavour to show that, by borders constructed on the following plan, this is quite practicable, and I also feel convinced that it is comparatively inexpensive, as the material employed to produce the heat is nothing more than fermenting manure, which, with the same end in view, is frequently laid on the surface, where it is objectionable in well-kept places on account of its unsightliness. I am aware that the expense of forming a vine-border on this plan is large; but as all difficulties connected with a bad subsoil, and many others which a gardener has frequently to contend with, are entirely removed, and as he has a perfect control over circumstances, instead of having his endeavours constantly thwarted by them, he, with proper skill, is certain of success, which will amply repay the first outlay.

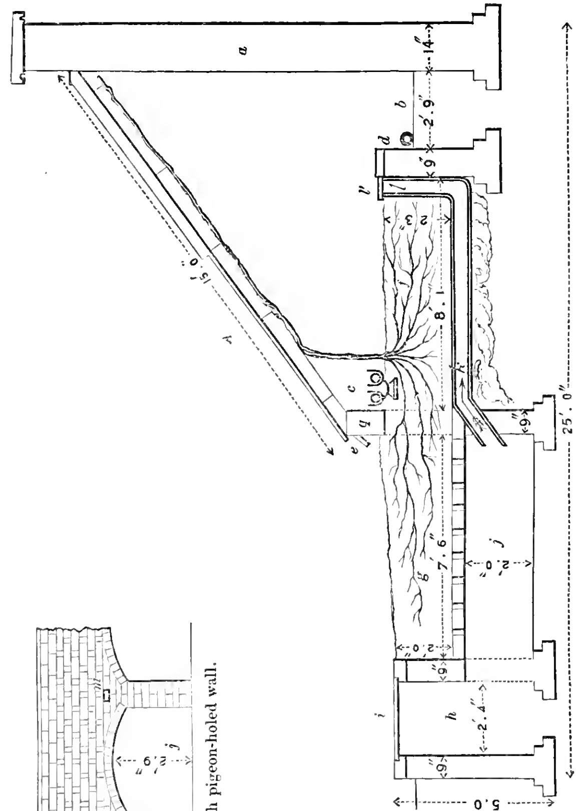
Soil varies so much in different localities, that it is almost superfluous to mention what I find to answer best for early forcing; but I am firmly of opinion that it should not be *too* rich for this purpose. The soil used in making the border I am about to describe consisted of light, rich, turfy loam from an old pasture, mixed with some crushed bones and lime rubbish. When any further stimulant is considered necessary it is supplied in the shape of liquid manure.

I believe the admission of the ammonia through the holes in the arches amongst the roots, and through the pipes into the house, to have a very beneficial effect upon the plants, particularly when the young leaves are expanding.

The only trouble necessary with the border is to lay a coat of dry fern upon it in September, and over the fern a tarpauling: these remain on all the winter.

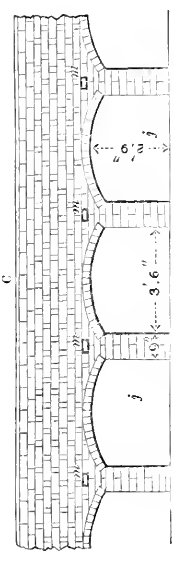
This plan will recommend itself strongly to those who desire to keep their gardens scrupulously neat, as there is nothing unsightly in the tarpauling, and at a short distance it is scarcely distinguishable from the natural soil; the neat stone curbing also and the Valencia slate-slabs form a clean and ornamental path in front of the houses.

The bunches and berries attain a very large size in these houses, but I am of opinion that moderate-sized bunches, excepting for the purposes of exhibition, are much more satisfactory than very large ones, since the berries swell and colour better, and the bunches retain their bloom more perfectly and look better when dished up, keep up a supply longer, and when it is necessary to send the supply to a distance, they travel infinitely better: it will therefore be well to reduce the large bunches to a moderate size.



Section.

C



Elevation of Arches supporting border, with pigeon-holed wall.

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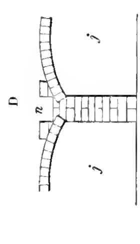
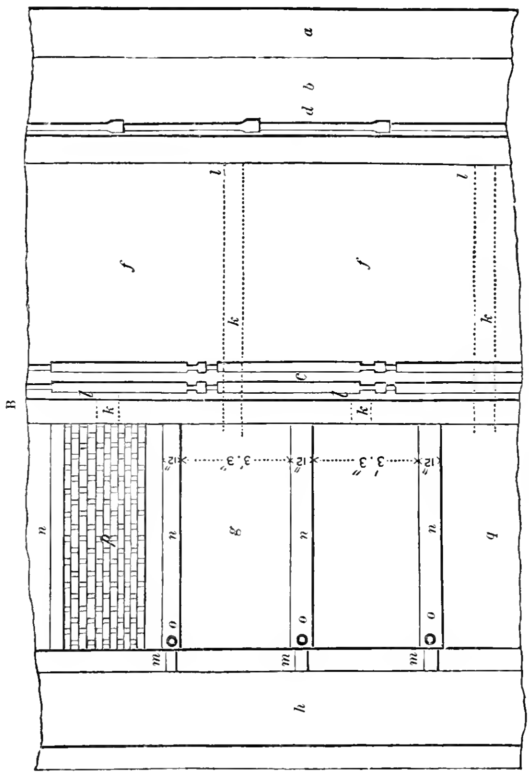


Section of Arch, showing tank.



Ground Plan of portion of Vine-Border.

Description of Plan.

a Back wall. *b* Back path.

c Flow-pipes, consisting of 2 lines of trough-pipes 3 inches in diameter.

d Return pipe, 3 inches plain. *e* Front ventilators.

f Border inside the house communicating with outside border *g* by arches in front wall.

h Dung-trench. The wall on the border side of this trench is arched below and pigeon-holed above.

i Valencia slate-slabs, 1 inch thick, fitting into a rabetted curbing-stone.

j Dung chamber beneath vine-border, with arched roof: these arches are built with pigeon-holes as shown at *p*, through which the ammoniacal gas arising from the fermenting material enters the drainage and the soil and is absorbed by the roots.

k Six inch common drain-pipes, with openings inside the house at *l*, through which the ammonia from the chamber *j* passes into the house and is absorbed by the young leaves. The openings *l* are provided

with covers *l'*, by which the ammonia may be admitted into the house or not, at pleasure.

n Cemented brick troughs or tanks, perfectly level, 12 inches wide, 6 inches deep, extending from the front wall *q* to the front of the border *g*. These tanks, by means of a 3-inch pipe at *o*, are filled with manure-water at those seasons when it is thought advisable to give the plants an extra stimulus. There is an aperture in the front wall of the border at *m*, through which the hand with a small scraper can be introduced to clean out the tank and ascertain its wants.

XXX.—*Notice respecting Two Varieties of Grapes.* By John Williams, C.M.H.S., of Pitmaston.

(Communicated November 12, 1846.)

Some three or four years ago I sent you specimens of a seedling grape which I raised from the White Nice, impregnated with the pollen of the small Black Cluster so common on our walls. The object was to obtain a hardy grape for culture on south walls, having a small black berry, spreading its bunch, and not crowded and wedged together like the common Black Cluster, the Miller, and all the Burgundy grapes. The experiment completely succeeded. I have obtained the small black berry, with an enlarged loose-growing bunch. In a good season it becomes perfectly sweet on a south wall by the middle of September; but this year it has gained little further maturity for the last six weeks, owing to the wet cloudy weather we have experienced. The wasps and flies having made an early attack on the fruit, each bunch was enclosed in a bag of crape or other thin material, which has, with the leaves, much obstructed the light and heat. However, for some time past, my family have preferred them to the grapes ripened under glass: they say they taste "fresher and more juicy." I have desired my gardener to pack up a small box of grapes to go by the railroad this evening. The box contains two bunches of the "Nice Cluster" grown on a south wall, and one bunch of the same vine *ripened under glass*. Some of my friends, who regard flavour more than size, have cut away their Hamburgh Grapes, and cultivated this instead. When so cultivated it ripens early, and will remain sound on the vine long without shrivelling.

I have also sent you two bunches of a white grape which has become a favourite with me. It is the offspring of a *Seedling White Muscadine* (Chasselas) and the *pollen of the Muscat of Alexandria*. It does not, in appearance, in the least resemble its male parent, the berry not being oval, nor the flesh hard; but it has some of the perfume of the Frontignan Grapes, and the berry never shrivels like the Black, White, and Red Frontignans. The bunch is small, but a very great bearer, and the smallest

shoot produces two bunches, and brings them to perfection. It will hang long on the vine without decay or shrivel; and since I have obtained it I have cut away all my Frontignans.

If you recommend my Nice Cluster Grape for culture on the open wall, let it be planted against a south-east wall, in a *very shallow* light soil, the depth not to exceed 18 or 20 inches, the vine being so unusually vigorous in growth of wood that a deep soil would retard its ripening; and I believe this observation applies to all grapes trained to south walls, for on the shallowness of the soil depends the earliness of ripening.

Specimens of the grapes referred to in the above communication were received, and the following notes were made respecting them by Mr. Thompson, November 17, 1846:—

The Nice Black Cluster—so called from its having been "raised from the White Nice, fertilised with the Small Black Cluster"—partakes of the loose shouldering of the female parent, and black colour of the male.

From a vinery, the bunch was nearly a foot in length, with long loose shoulders; berries small, roundish or roundish-oval, on long pedicels, black; juice a little tinged with purple, sugary. Probably an excellent wine grape, the looseness of the bunch admitting, without thinning, a play of sun and air.

From a south wall, the berries were not so sugary; but the formation of the saccharine principle was this year much checked, as Mr. Williams observes, by the cloudy and wet weather which occurred at the time, when out-of-doors' grapes would have otherwise acquired the highest perfection probably ever known in this climate. This variety was first noticed in the Transactions of the Society, second series, vol. ii. p. 112.

The Seedling White Grape sent along with the above, raised from the "White Muscadine (Chasselas)" and pollen of the "White Muscat of Alexandria," has acquired a little of the Muscat flavour of the latter, and is a very good imitation of a Frontignan, deserving farther trial.

XXXI.—*On the White Rust of Cabbages.* By the Rev. M. J. Berkeley, M.A., F.L.S.

(Communicated August 26, 1848.)

There are few natural groups of plants which have not their own peculiar parasite, which lives and decays, indeed, for years unheeded by the common observer, until some season peculiarly suited to its growth arrives, when it is too abundant

or noxious to escape the most careless. The present season has been very productive of different kinds of blight. Scarcely a bramble is to be seen which is not completely discoloured by rust; the withered aspect of the bean-crop has attracted general notice; not a row of garden peas but is covered with *Erysiphe*, and the ravages of *Botrytis infestans* on the leaves and stems of potatoes are unhappily too notorious and fatal. In my own district nothing can have been more general, and in many cases pernicious, or even destructive, than the white rust (*Uredo candida* of authors) which is so common on cruciferous plants. They have indeed several other parasitical enemies; but this is perhaps the most general, and extends its visitations either under the same or under very slightly different types to several other families of plants. It has been found on plants belonging to

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several divisions of Compositæ, on Euphorbiaceæ, Portulaceæ, Malpighiaceæ, Chenopodiaceæ, Convolvulaceæ, Caryophyllaceæ,

Capparideæ, Amaranthaceæ, and possibly on species of some other families to which I cannot at present refer. Its geographical range is also most extensive, extending in the northern hemisphere from high latitudes as far south as South Carolina, and it occurs in the Falkland Islands on *Arabis Macloviana.* It is besides frequently accompanied by *Botrytis parasitica*, which there is much reason to believe is sometimes as pernicious as its near ally *B. infestans.*

It was in a species of the last-mentioned natural order (Amaranthaceæ) that in the spring of the present year my attention was first turned, on the examination of specimens received from the Rev. M. A. Curtis, of Society Hill, South Carolina, to the peculiar structure of this parasite, and my observations have been at once confirmed and anticipated by my excellent friend Dr. Léveillé, in an arrangement of Uredineæ, in a late number of 'Annales des Sciences Naturelles,' which bears date Dec. 1847, but which was not published till some months later.

There was no difficulty at the time in procuring fresh specimens for examination, for so early as the end of March not a cabbage or colewort in my garden was free from the white rust; and as the season advanced, the young as well as the nearly mature plants became affected, presenting frequently a disagreeable leprous appearance, deranging their growth, and sometimes materially affecting their produce. At length, in the month of June, the flowering plants exhibited the disease to an extraordinary degree, and became so strangely distorted, that on a cursory inspection it would have been difficult to say to what species a gathered specimen belonged. Every part of the flowers had become immensely enlarged; the leaves of the calyx and petals assumed a gigantic size, the latter retaining in some measure their proper yellow tint; the stamens too were distorted, and the pistil projected beyond the now persistent blossom, and instead of being as usual narrow, was a quarter of an inch or more in width, and very much compressed on the sutural side, and on opening the young carpels, their inner surface, and in some cases even the placenta, was infested with the white spots of the rust. In some cases every flower and pod was affected, in others the mischief was confined to two or three upon a stalk, so as not to prevent entirely the production of seeds. Nothing indeed could well present a more singular appearance than the plant with its swollen and distorted leaves, its occasionally abortive panicles, of which nothing remained but roselike tufts formed by the gouty stem-leaves, and above all the powdery heads of buds and the pendent fleshy flowers as large as those of *Albuca major*, and with somewhat of the same green and yellow aspect.

I was greatly disappointed, on a minute comparison of the flowers and unripe seed-vessels with those in a normal condition, to find that there was no essential derangement of the fundamental structure, no metamorphosis properly so called, but simply an enlargement of all the parts and a general looseness and hypertrophy in the cellular tissue, arising partly perhaps from the stimulating effect of the mycelium, and partly from the mere mechanical agency of its growth. The dissepiment alone was in proportion far narrower than usual, and extremely delicate, as though the placenta had been enlarged at its expense. There was nothing to throw any light on the true import of the parts of the carpels, the arrangement of the cellular structure being absolutely the same in both instances, though infested everywhere with the mycelium.

It should be observed, that wherever the mycelium did not penetrate, everything presented a perfectly natural appearance without any indication of disease; nor indeed is there any reason for supposing that a diseased condition of the tissues preceded the growth of the fungus, which in that case would be a mere after-organization. Were the fungus in the first instance external, there might be some shadow of foundation for such an opinion, but the cuticle is perfectly closed till the mass of spores is burst through it, and the sori, as noticed above, make their appearance in the closed cavities of the carpels exactly as *Botrytis infestans*, as observed by Payen and myself last autumn, in the fruit of the Tomato, where there was no immediate communication with the atmosphere. And the case is even stronger in some other fungi, especially in *Granularia violæ*, Sow., which has not been observed for many years, and had been quite misunderstood till its appearance in Captain Munro's conservatory near Clifton last winter, and (as recorded by Professor Forbes*) in Portland during April of the present year. In that curious production the spores are deeply seated, and the sori do not burst, if they burst at all, till the whole parasite has been long perfectly developed.

The influence of fungi, however, on perfectly healthy tissues is now an established fact. The case of bunt is a well-known example, the spores of which constantly reproduce the disease; and if instances are not sufficiently satisfactory in the vegetable kingdom, we have only to turn to the facts recorded respecting the origin of the disease of silkworms, called Muscardine, from the spores of a species of *Botrytis*, to show that fungi do not

* In Viola odorata, when attacked by Æcidium violæ, I have seen the stipules assume the form of perfect leaves in consequence of the general luxuriance of the plant. See 'Gardener's Chronicle,' July 1, 1848.

grow exclusively on languishing or decaying organisms. Prejudice to the contrary is so very strong and general, and is still in ignorance of facts bearing on the subject, so often put forward, that the real state of the case requires to be frequently pointed out; especially since incorrect preconceptions on this subject may be of very evil consequence in minute research as to the origin of disease both in the animal and vegetable kingdom.

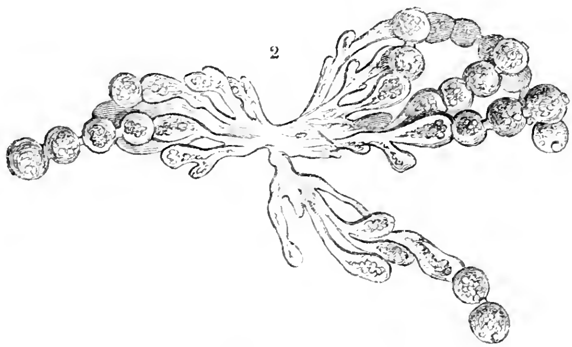
Almost every one is now agreed as to the real nature of Uredineæ since the observations of Léveillé and Corda, which have been confirmed by a host of microscopical observers. Only a few German speculators, in their zeal for spontaneous or equivocal generation, still adhere to the views of Unger, that they are mere transformations of the tissues from which they spring. An incidental observation to this effect occurs in a late number of the 'Botanische Zeitung.'

The structure of the white rust of which we have been speaking, differs so much from that of most other allied forms, that it is strange that it should not have been ascertained before. There is indeed in the work of Unger, on what he calls the Exanthemata of plants, a correct figure as far as it goes, tab. VI. f. 32, but he has merely given the cysts from which the spores spring, each terminated by a single globose spore. This is the more remarkable, because he was the first to describe the spores of Æcidium as arranged in moniliform threads, a structure which has been beautifully illustrated by Corda, and which any one can easily convince himself is correct. The moniliform threads are not less visible in the white rust, and the spores are connected with each other by a short cylindrical process exactly as in some species of *Oidium*. The best way to observe the structure, as indeed is the case with all epiphytal fungi when practicable, is to make a thin vertical section, which will exhibit not only the necklaces of spores, but the obovate cysts from which they spring, and the curious irregularly branched, often thick and nodose greenish mycelium, which, as Mr. Broome correctly observed to me, resembles more in form and general habit the structure of *Hæmatococcus Almanni* than any other vegetable substance. Besides this irregular thick mycelium, there are also fine mucedinous threads which penetrate deeper into and amongst the tissues of the matrix, and resemble the more usual form of mycelium in Uredineæ. The figure of the general structure of the species is by Mr. G. H. Hoffmann, that of the younger state by Mr. Broome, and that of diseased panicles of a sugar-loaf cabbage by Miss A. Vidal, who has made some pleasing contributions to Miss Henslow's 'Ocean Flowers.'

Dr. Léveillé has described the genus under the name of *Cystopus* with very correct characters. It is to be wished, how-

ever, that he had adopted Schweinitz and Rabenhorst's sectional name of *Albugo* (Rab., Crypt. Fl., vol. i. p. 13), which is far more expressive; and as a general principle sectional names ought certainly to be adopted when the sections are raised to the rank of genera. Whether there be more than one species of *Cystopus* is perhaps doubtful, though the spores differ somewhat in form. Now that the true structure of the genus is ascertained, attention may be turned to the question with greater probability of a satisfactory result.

I observe in conclusion, that *Cylindrosporium* of Greville



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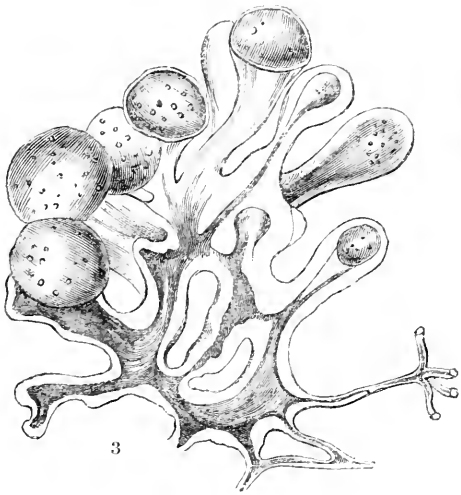

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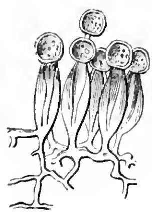

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has nothing to do either with the present plant, or what Unger has referred to that generic name. An opportunity of inspecting a perfect authentic specimen of this plant, which does not seem to have been observed by any other mycologist, has shown that it belongs to another group, the spores, which are very minute, oozing forth in irregular masses, and in fact allied to Nemaspora. Dr. Léveillé's observation then, as far as Dr. Greville's plant is concerned, requires correction.

Explanation of the Figures.

1. *Cystopus candidus*, Lév., on cabbage, natural size.
2. Threads of spores, with their sporophores and mycelium magnified.
3. Spores, sporophores, and mycelium from a young plant more highly magnified.
4. Ditto, from *Uredo Amaranthi*, Schwein., magnified less than the two preceding. The figure is taken from a dried specimen, and consequently exhibits a less succulent mycelium.

XXXII.—*Notice of a Visit to Pitmaston, near Worcester, May* 25, 1848. By Robert Thompson.

(Continued from p. 235.)

The peach-house is 25 feet long and 19 feet wide; it is heated by hot-water pipes, a flow and return, in the usual way. Four feet has been added in front to the width of the house, and in this space of 4 feet, between the old and new front walls, filled with rich soil, the peach-trees were planted, and are thriving well. The pitch of the roof is at an angle of 21 degrees. This house was originally constructed for the purpose of growing Persian melons, and the arrangement for a circulation of heated air still remains. The house was then 15 feet wide, and heated by flues so deep that they may be termed hot-air chambers. The back wall is 10 feet high from the level of the ground; the house is entered by a door in the middle of this wall. On entering there is a descent, by steps, of 2 feet to a paved floor, and nearer the flues a farther descent of 10 inches, so that the flues are based 2 feet 10 inches below the ground-level. The front flue is 4 inches from the original front wall; between this flue and the return one parallel to it there is a space of 6 inches. Crossing the end, the return flue terminates in an upright iron cylinder in the north-west angle, at the back wall. Standing on the paved floor of the house, 2 feet 10 inches below the outside ground-level, the flues are seen to be supported on a series of flat arches, seven in number, extending from end to end of the house; a nearly close breast-work is however exhibited, the arches being closed in, with the exception of three air-passages in each.

These passages are 5 by 3 inches; the two lower ones in each arch extend across, on the level of the floor, under both flues, and communicate with the 4-inch cavity between the front wall and flue next it. Thus, fourteen air-passages are in communication with this cavity, and the other seven air-passages communicate with the 6-inch cavity between the two flues. By this arrangement the cold air was rapidly drawn from its lodgment on the floor of the back-part of the house, brought into the cavities by the sides of the warm flues, there heated, and consequently rarefied; it could not rest, but must of necessity continually ascend, and give place to a successive influx from below through the respective air-passages. The flues, or hot-air chambers, are 18 inches deep inside, and the cavity between them is 23 inches deep; this arrangement is said to have afforded a complete circulation. It will readily be perceived that it is a modification of the Polmaise system: in fact, the same principle acted upon more than twenty years ago.

In detailing the construction of the flues, both in this house and in the Vinery, it was mentioned that the brick portions were terminated by hollow iron cylinders; the lengths of these were equal to the heights of the respective back-walls above the level of the brick portions of the flues. Metals being much better conductors of heat than the materials of the flue, the iron tube would, of course, extract more of the heat which the gases still possessed after passing through the brick portions than would otherwise be the case. In point of economy of fuel, no mode of heating excels the flue, and its power exceeds that of all others occupying the same space, if we except steam apparatus, and this, for obvious reasons, is now rarely employed. An immense assemblage of hot-water pipes is required to keep up a house to 70°, when the external air is 20° below freezing; to heat the water sufficiently for all these pipes a strong fire must be maintained; and hence a large amount of air and carbonic acid at a high temperature must pass by the chimney, by which, it is indeed probable, as much heat is dissipated in the open air as is radiated from the pipes inside the house. That brick flues have their faults no one will deny; but surely improvement in flues will not remain almost stationary, as at present? Or, will it be affirmed that they must ever be constructed nearly in the same way as they were when first introduced by the Romans? A safety-valve, as previously noticed, may be adopted so as to effectually prevent their bursting; and Mr. Williams's idea of employing metal doubtless admits of extended application. My opinion in regard to this is founded on the circumstance of having actually seen cast-iron tubes employed for flues in France, in 1847, at two establishments, one

belonging to a market-gardener near Versailles, and the other at the Parc du Fromont, near Ris; the details respecting which will be found vol. ii. pp. 220, 241.

The fire-place for heating the house under consideration is not roofed in; but the radiation of heat from the furnace-door and front of the fire-place is economized by a cloak of sheet-iron, through which the air is admitted by a hole in the centre. The cold air, thus admitted to the concave space formed by the sheet-iron cloak, becomes heated to some extent before it reaches the fuel; and the advantages of heating the air before it is admitted to blast furnaces have been ascertained to be considerable.

Mr. Williams has long endeavoured—not in vain—when the seasons proved favourable, to grow the melon in the open air; a practice, he observes, "by no means common in this part of the kingdom, though I believe frequent in the more southern counties." So long ago as the year 1823, he wrote as follows to the Secretary of the Horticultural Society:—"I have, for some years past, been trying to give increased hardiness to the melon, and with this view have made use every year of the seed matured in the open air during the preceding summer. The plants have, in consequence, become so hardy, that in the two last seasons they grew, and the fruit set as well as a common gourd. The whole contrivance for presenting the plant to the solar influence in the most advantageous way, and at the same time giving a little warmth to the roots, does not cost more than a few shillings." He adds, "I have already cut fifteen melons, and my gardener tells me there are upwards of thirty-five that will ripen before the plants are killed by cold." Such was the success which attended his commencement. The method he then practised is described in the 'Transactions of the Horticultural Society,' First Series, vol. v. p. 349, to which I beg to refer those who wish to follow up his plans, and shall proceed to detail the particulars of the culture as it is at present being carried on.

The open-air bed is raised on the ground-level, on a base 24 feet in length and 8½ feet in width. The back is of brick-work, 3 feet 3 inches high; the ends are also of brick-work, and slope from the above height at back to the level of the ground at the front. The bed is composed of weeds, bean-stalks, old tan, garden rubbish, and litter of any kind, made compact; and finally, about 9 inches of only common garden-soil, in which the melons are planted. When finished, it presents a uniformly inclined plane, facing the south; but Mr. Williams thinks he should prefer an aspect a little to the south-east. As the soil is raised a little higher than the back, to allow for sinking, the slope, at the time I saw it, formed an angle with the ground-line

of about 23°. Nine plants, raised singly in pots, were planted out on this slope, and, till somewhat established, they require to be protected by hand-glasses; flat tiles are then laid over the surface. The shoots or vines of the melons are neither stopped nor thinned; in short, with the exception of merely pegging them down, there is nothing at all done to them. Instead of tiles being employed, as above, slates were formerly used; but these became at times so excessively heated by the sun's rays, that the plants suffered from being subjected to the consequent vicissitude of so great a heat in the day alternately with the cold to which they were exposed at night. Tiles, on the contrary, do not absorb heat so rapidly, but they retain it longer.

The situation of the melon-bed is not particularly sheltered; there is a hedge on the north side at the distance of 15 feet from the back of the melon-bed, but it is not high. Two feet behind the hedge there is, however, some tall elm-trees, and at some distance there is a row of the same kind of trees which afford shelter from the west winds. The mode in which the plants are reared is an important point: they are raised with as little heat as possible, and are all along accustomed to plenty of air. Mr. Williams remarks that, "when melon-plants are raised for the purpose of being planted on a bed of the above description in the open air, the pots in which the seeds are sown should never be plunged in a warm dung or tan-bed, or the roots exposed to what gardeners call bottom-heat; as I find by experience, that when plants so treated are removed into the common ground, if the weather proves cold and wet their leaves turn yellow, and they afterwards become sickly, and continue so a long time." *Horticultural Transactions, First Series*, vol. v. p. 351.

A glazed pit, also for the growth of melons, has the back and ends of brick, but the front rests on supports of 2-inch cast-iron pipes, leaving an opening of 9 inches between the lower end of the sashes and the ground, or rather a slate paving, which extends outwards in front to the distance of $2\frac{1}{2}$ feet. The space between the ends of the sashes and the outside of the slate-paving is covered over with wire gauze, which not only breaks effectually any strong current of air, but imparts warmth to it when the wire is heated by radiation from the slates. This is described in 'Horticultural Transactions,' Second Series, vol. ii. p. 161; and the diagram at p. 163 will give a sufficient idea of the pit, a brick-work back and ends having since been substituted for the former supports, the other arrangements remaining the same.

At a corner of the lawn, west from the rockwork, a larch, which was topped when 12 or 13 feet high, upwards of thirty years ago, forms a very picturesque object; it is represented in

the 'Gardener's Chronicle,' No. II., 1848, p. 171; its circumference at the base is 5 feet 10 inches.

The soil appears to suit the Pinus tribe. A remarkably handsome specimen of Abies Douglasii was 31 feet 8 inches high, according to the means I had of ascertaining; its growth must have been uniform, judging from the regularity of its outline.

A weeping-ash, at some distance from the conservatory, had a very good effect from its dome-like appearance; its trunk appeared to be upwards of 4 feet in circumference, and was 5 feet clear to the branches. The top of its crown was from 28 to 30 feet high.

There is a magnificent tree of the White Willow (Salix alba); the trunk is large and very deeply furrowed, partly owing to limbs having been occasionally broken. This tree was frequently noticed attentively by Mr. Knight, from its affording evident indications of the courses of returning sap traceable along the trunk towards the roots.

A Mulberry-tree, which formerly produced more female flowers than male, has been observed by Mr. Williams to produce the contrary within the last few years. It is growing on the lawn, and has undergone no change of circumstances as regards its situation, nor has it been in any way interfered with. Mr. Williams therefore concludes its character must have been altered by the seasons.

Yellow roses have generally an unpleasant odour; but Mr. Williams has one, the Pitmaston odorata, which is agreeably scented.

In the conservatory the orange-trees exhibited a very healthy appearance. Their foliage was of a darker green than is usually to be seen on large orange-trees in this country. They had flowered most profusely; and enough still remained to scent the air to a considerable distance outside, on the lawn and around the house. The conservatory adjoins the house at the south-west end. It is 33 feet in length, and 28 feet wide, with a dome in the centre, consequently a large surface of glass is exposed to radiation. But fire-heat was only applied during three nights in the course of last winter, which was by no means remarkably mild; for on 75 nights the thermometer was below freezing, frequently below 24°, and even as low as 17° Fahr. The floor of the conservatory is grated; and underneath the grating there is a chamber with which a large drain communicates. This drain is 70 yards in length, from the conservatory to the place where its further extremity is exposed to the open air. Pure spring water, out of the sandstone, flows constantly along the drain, imparting its temperature to the air passing over it into the chamber below the conservatory. The running water en-

sures the purity of the air; and if the latter should enter cold and dry, it will become comparatively warm and moist before its introduction to the conservatory; as its temperature is progressively increased in its passage, so will likewise be its capacity for moisture, and this the evaporation of the water will abundantly supply.

It is to be regretted, that all the data necessary to estimate the full amount of heat afforded by the above arrangement have not been obtained. Such would have comprised the temperature of the water in the drain, close to the conservatory; its temperature at the farther extremity, just before its egress into the open air; the temperatures maintained in the conservatory when in communication with the drain, and when the latter was cut off; and the relation which both these bear to the external cold; and, finally, the exact dimensions of the drain, and the quantity of water discharged by it per minute.

It is known that the temperature of spring-water differs little, either in summer or in winter, from the mean temperature of the climate. That of the Society's Garden, which may be considered similar to the climate of many other places having the same, or nearly the same latitude and elevation, is between 49° and 50°, on an average of 22 years. Supposing, however, that spring-water is only of the temperature of 48°, the width of the drain 3 feet, and depth of water 2 inches over the bottom of the drain; and that the water lost one degree of heat per minute. I have ascertained that the above depth of water will lose as much as one degree per minute when the water is 30° warmer than the air to which it is exposed, even with very little wind at the time. Hood states in his Treatise on Heating, that a cubic foot of water in cooling one degree gives out as much heat as would raise 2990 cubic feet of air one degree. Then a drain 70 yards, or 210 feet in length, and 3 feet wide, would have a bottom area of 630 feet; and 2 inches deep of water over this would give 105 cubic feet, and this quantity of water, according to the above data, by losing one degree of its heat, would raise 313,950 cubic feet of air one degree, or 10,465 feet thirty degrees. It has been calculated that one square foot of glass will cool 1·279 cubic feet of air under it one degree per minute, when the external temperature is one degree lower than the internal. Hence, the above 10,465 cubic feet would maintain the air under 8182 square feet of glass as much as 30° above the temperature of the external air, or supposing the latter to be as low as 16° Fahr., a conservatory having a surface of glass equal to 8182 square feet would be kept at 46°, provided the full heating effect could be brought to bear upon it.

Count Rumford, however, estimates much lower the amount of heat which would be communicated to air by the cooling of water. He states, that a cubic foot of water in cooling one degree would give out as much heat as would raise the temperature of a stratum of air over it, and 44 times as thick as the water, 10°. This is equivalent to heating 440 feet one degree. According to this, instead of 10,465 cubic feet, only 1540 would be heated 30° per minute, a quantity sufficient to maintain that number of degrees above the external air under no more than 1204 square feet of glass; still this would be equal to the heating of a moderate-sized conservatory, even in very severe weather.

Although enough of heat may be generated in the manner described, yet the great difficulty is its conveyance into the interior of the conservatory, and the disposal of the vehicle after it has parted with its heat, namely, the disposal of, say 1540 cubic feet of air per minute. This would require for its introduction a velocity of nearly two miles an hour through a passage 3 feet square; and this is more than the difference of temperature at the warm and cold ends of the drain would ensure. It is true, a very small stove adapted to act near the upper end of the drain would powerfully assist the draught; and when introduced, a considerable portion of air would constantly escape by the openings of the glazing. In fact, according to the old mode, the spaces between the laps would be amply sufficient; and perhaps there are cases in which that mode of glazing would prove the best for the health of the plants. In the arrangement under consideration it might be adopted with advantage; for by this arrangement air would be continually passing outwards by the spaces, tending to prevent the rush of cold air inwards, which such spaces were justly complained of for admitting, in severe weather more especially.

The calculations given in the course of the above remarks are necessarily imperfect; yet they may serve to induce experiments on the subject, by which correct data may be afforded, and important results will doubtless be derived from such; for the dark green foliage, and excellent condition in every respect of the orange-trees in the conservatory at Pitmaston, warrant this expectation.

XXXIII.—*Potatoes for* 1849. By R. Errington, Gardener to Sir Philip de Malpas Grey Egerton, Bart., M.P., F.H.S.

(Communicated August 26, 1848.)

If there is one fact well established in the history of the potato disease, it is this—that, under present circumstances, early kinds,

early planting, and early removal from the soil, are by far the most important points. Many are deterred from this proceeding from an idea that potatoes thus early are only fit for the table for a few weeks. To say that they will keep as firm until May or June as the old red or pink-eyed class, is indeed to attempt to prove too much. Nevertheless I can, I conceive, point to a course of management which will ensure very excellent and sound potatoes until the month of April, by which period we shall have turned our backs fairly on the winter, and the rising spring will bring increase of both hopes and produce.

It is a very common practice, especially with early potatoes, to throw them on a barn or outhouse floor, or in what is termed the potato-hole. It is common also for our London dealers to expose wares of this kind in baskets at the door of the shop. Now this course I must suggest strikes at once at the root of both the keeping as well as the eating properties of not only potatoes but vegetables in general. The great difference therefore between vegetables thus exposed and those fresh from the garden is proverbial. It is well known that certain conditions are absolutely necessary, in a greater or less degree, with all vegetables, in order to preserve them as fresh as possible. The principal of these are as follow:—

1. Freedom from fermentation.
2. A cool atmosphere.
3. A slight degree of humidity in the air.
4. An exemption from much light.

In addition to these points, which in the main, with a few trifling exceptions, apply to both tubers and ordinary vegetables, I would urge on behalf of the tubers an exclusion of the immediate action of the atmosphere.

These principles being admitted, it follows that the exposure plan is fundamentally wrong; and it becomes the public to consider, under our present trying circumstances, whether a good crop of early potatoes may be secured; and whether, by a due attention to the above principles, a reserve of this national root may be provided until the terrors of winter are passed away. This brings me to the point I wish to press on the attention of all parties interested in the potato affair (and who is not?), viz. the getting an unusual breadth of the *very early* kinds into the ground by the middle of March; and, in addition, taking them from the soil as soon as full-sized, and storing them in pits by a mode I will suggest in the course of these remarks.

The ash-leaved kidney is still undoubtedly one of the best potatoes in the kingdom—indeed the best of all for very early purposes, provided the seed is carefully preserved, and fermenta-

tion avoided. This potato appears more susceptible of abuse than any other; and so well is this understood in districts where the cottagers make considerable profits from them, that they will by no means put their seed in pits, but lay them on dry floors or put them under their beds: some put them in old tubs or boxes. This potato can by no means endure fermentation, which it is almost sure to encounter in pits. Does not this then offer a hint that fermentation may have been one fruitful cause of the present disease? This kidney, on account of its precocious character, must not be kept in a very damp situation for seed purposes, it being liable to sprout with the least excitement, and if the first sprouting is destroyed, it is no longer worth planting: it is almost sure to breed abortion at the root, without producing sound stems. This, then, is one kind of potato of which I would advise a much increased breadth in the ensuing spring; and to that end seed should be secured immediately, and preserved on the above principles. Their keeping properties are very considerable: they will be fit for use until March, if properly managed.

The early Kents, so much cultivated in most parts of Lancashire, would also be very eligible under existing circumstances; and there are many second earlies, some possessing the recommendation of a pink eye, indicating keeping properties, which should be entered largely into. A kind known extensively in Cheshire as the blue farmers (probably a cross between some of the old Oxnoble or cattle potatoes and the old blacks) has withstood the disease perhaps better than any kind: this might be also much cultivated. Whatever kinds are used, three points are absolutely necessary: viz. *early planting*, not later than the middle of March; *early taking up*—that is to say the moment the disease blotch appears on the leaf, for immaturity is better than disease; and, lastly, an avoidance of fermentation. And this brings me to the point I would suggest as to pitting.

In the first place, I would build all the pits or stores above the ground-level, rather on an elevation: no water may be permitted to stand by them. In the second place, I would both strew the ordinary soil all through them, and also form a core entirely of soil down the centre of the pit. This will entirely prevent fermentation, and is precisely the plan I adopted last year with my outdoor mushroom-beds, and for the same reasons. These beds very often fail through the high fermentation of the manure; but the mixing one part of soil to two of manure, and introducing the core down the middle, entirely prevents great heat. Indeed, our beds were never above 90° (which should, if possible, be the maximum), and the success was so complete that we were not a day without mushrooms from the end of October

until nearly May. The soil amongst the potatoes not only prevents fermentation, but, by preventing contact, arrests the spread of accidental decay in any of the tubers.

One great point will be gained to the country by this early course—a point, I conceive, that involves a profit of some millions in the aggregate. Potatoes will be entirely off the land by the middle of July: thus a crop of turnips may follow, or the best of opportunities will be afforded for a preparation for corn of any kind, and for cleaning processes.

By this mode, however, I would in all cases avoid the use of manure; or, if used at all, I would have it thoroughly decomposed. My design in using very rotten manure would be merely to give the young stem a quick impulse as soon as above ground, thus accelerating the maturity of the plant, in consonance with the principles before laid down. I would, however, be very sparing in the use of it, being persuaded that, although not the cause of the disease, as I conceive, it has at least caused a great aggravation of it. Indeed, wherever early maturity is desired, manures should be sparingly used. They in all cases, whether of fruit or vegetables, retard the ripening or flowering period. This is well known to men of experience. It is a phenomenon daily before the gardener's eyes. Soils in pretty good heart, without manure, should therefore be selected; and for this early course the soil should be in the best of tilth.

Some, it seems, are of opinion that *Botrytis infestans* commences its ravages at the top of the potato-stalk: this is surely a mistaken notion. I have constantly watched the disease in all its stages, and have each year felt assured of its approach as early as the beginning of June, on account of the discoloration at the base of the stem generally manifesting itself about that period. According to my ideas, this fungus, like most of the order, revels in the most nutritious matter; and the accumulated stores in the tuber being exhausted by it, together with the act of sprouting, the fungus works its way upwards at the very period when rich secretions are being deposited in their fresh storehouse—the new tuber.

I have noticed in many cases that the disease, after commencing at the end which connects the young tuber with the parent stem, proceeds with great speed to invest the eye-ends. It has occurred to me, therefore, that there is probably a greater concentration of quality at that part for the supply of the young buds. During a residence of some twenty years in Cheshire, I have witnessed the introduction and wearing out of very many kinds of potatoes—each in its day esteemed as a paragon of excellence. Strange, however, to say, none of them produce more per acre than those that preceded them. I have inquired particu-

larly of the old people as to the average produce of former days, and find that from three to four bushels per Cheshire rood of eight yards square was and still remains the estimated amount of a good crop. I think it tolerably evident, however, that rather more stimulus is required in these days than formerly. This may be owing to the introduction of turnip husbandry, by which course the soil becomes robbed, in some degree, of its organic matter, or, in other words, there has been an increase of tillage. Now there must be some reason for this wearing out: this surely cannot be termed atmospheric.

The old ash-leaved kidney remains as sound as ever, at least with me, and produces enormous crops; but, as before observed, this kind has never suffered a fiftieth part of the abuse which other kinds in general, especially the later sorts, have undergone. Here then *rests a strong fact*, to which I would beg respectfully to draw attention.

Again, the old red-apple class, which was so highly esteemed in this district a few years since, on account of its keeping properties, is now all but extinct in this quarter. These potatoes were in the habit of bringing enormous prices formerly in the Manchester markets, during the months of May, June, and even July, being extensively worked by the bakers in bread-making during the high price of wheat. All this induced the farmers to plant later and later still, until at last it was no uncommon affair to see them planting this very late ripener in the early part of June. One of our very best summers, however, is scarcely sufficient to ripen this kind properly for seed. This I have constantly urged to the farmers, but they are not the class of men with whom to discuss the organization of buds. Their minds need some farther preparation in order to comprehend this subject: we must therefore lay our account with the next generation. I have constantly seen these red potatoes, in October, "whipped to death" (for I can find no other term to express it) with cold blasts, when the tops were indeed quite young. I have planted the same kind in March in a warm garden, and could then scarcely get them matured—at least in the same sense in which the early kinds are matured. In addition to this, they had to undergo a fermentation of somewhere about 100° to 120° in the pits. Indeed many pits, uncovered a week or two after pitting, would smoke like a smothered bonfire. Now, if this is not an abuse of the constitution of the potato, what is? Ought not some bad results to have been expected from such a course?

XXXIV.—*Observations upon the Temperature to which Plants are naturally exposed in New Holland.* By the Vice-Secretary.

It is so unusual to find in books of travels any such accurately detailed account of the vegetation observed, and of the climate which influences it, as can be safely turned to profit by gardeners, that I gladly avail myself of an opportunity of placing before horticulturists a series of very interesting and unexpected facts relating to the climate of New Holland, whence so many of the most valuable plants in cultivation have been obtained. For these facts we are indebted to the zeal and intelligence of Lieut.-Col. Sir Thomas Mitchell, the Surveyor-General of New South Wales. That distinguished officer, in his last journey from Sydney northwards, in search of a route to the Gulf of Carpentaria, spent a year in traversing 10½ degrees of latitude, backwards and forwards. He quitted Sydney in the midst of summer, December 15, reached 21½° S. lat., his most northern latitude, on the 11th of August, when, turning his face to the southward, he arrived again in Sydney by the end of the year; a complete season having thus been occupied in the expedition.

During this period not only were observations of the weather taken four or five times a day, whenever the difficulties of the journey would permit, but the plants which were preserved by the naturalist attached to the expedition were also regularly dated, so that upon his visit to England Sir Thomas Mitchell's plants were capable of tolerably accurate comparison with his meteorological journal. The observations themselves are dispersed through his valuable Narrative;* but not having been condensed there with a view to establishing any general facts, I have thought it advisable to extract such parts as have a bearing upon horticulture, adding some further information derived from an unpublished Meteorological Journal, with which Sir Thomas has favoured me. To avoid unnecessary length, I have thrown together the observations in such a way as to make each set correspond with one degree of latitude nearly. The figures follow, day by day, under their respective heads, by which means the daily variations can be judged of as accurately as is needed for the establishment of horticultural principles. And, finally, a few

* Journal of an Expedition into the Interior of Tropical Australia, in search of a Route from Sydney to the Gulf of Carpentaria. By Lieut.-Col. Sir T. L. Mitchell, Kt., D.C.L. 8vo. Longmans, 1848.

general remarks on the weather have been selected in illustration of the meteorological observations themselves.

The facts which an examination of the materials at my disposal has elicited may be stated thus:—

I. Latitude about 32° S.—Elevation under 560 feet.

January 1 *to February* 13.

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Sunrise	97, 85, 78, 78, 80, 85, 88, 88, 85, 61, 60, 74, 80, 70, 75, 59, 47, 47.
Noon	109, 90, 100, 112, 115, 115, 103, 111, 104, 104, 80, 89, 94, 86, 96, 94, 73, 79.
4 P.M.	96, 108, 108, 112, 106, 106, 73, 89, 96, 90, 95, 98, 76, 77, 88.
9 P.M.	70, 80, 84, 90, 84, 88, 84, $100\frac{1}{2}$, 101, 88, 88, 68, 72, 73, 80, 80, 86, 61, 57, 63.
Humidity	·708, ·558, ·459, ·357, ·508, ·487, ·357, ·369, ·336, ·563, ·463, ·949, ·610, ·643, ·786, ·786, ·590, ·797, ·946, ·712.

Observations.—Jan. 6. Extreme heat and dryness.—Jan. 7. The day surpassed in heat any I had ever seen.—Jan. 13. Great scarcity of water; heat and consequent drought.—Jan. 23. Heat so intense as to kill the kangaroo dogs.—Jan. 27. Cart-wheels rendered unserviceable by the excessive heat.—Feb. 3. This was almost the first day during a month in which the air had not been warmer than our blood; often had it been greater than fever heat; rain fell and lowered the temperature about 40°.—Feb. 5. Earth so parched as to preclude travelling, and almost deprive us of sight.—Feb. 7. The rain had penetrated the clay soil of the plains about five inches.—Feb. 8. Extreme evaporation; the drier earth below seemed to be steaming the wet soil above.—Feb. 13. Suffering excessively from thirst and extreme heat.

Plants observed in flower or in full vegetation.—Atriplex semibaccata, Salsola australis, Halgania, Casuarinas, Acacia pendula, Callitris, Calotis cuneifolia, Atriplex elæagnoides, Teucrium racemosum, Justicia media, Stenochilus, Fusanus, Stipa scabra, Chloris sclerantha, Eremophila Mitchellii, Damasonium ovalifolium, Kochia brevifolia, Chloris acicularis, Trichinium lanatum, Aristida calycina, Neuraclne Mitchelliana, Pappophorum flavescens, Jasminum lineare, Alternanthera nodiflora, Capparis Mitchellii, Hakeas, Senecio Cunninghami, Trichinium semilanatum, Mesembryanthemums, Rhagodia parabolica, Acacia salicina, Kochia thymifolia.

II. Latitude about 31° S.—Elevation under 580 feet.

February 14 *to March* 4.

	°
Sunrise	54, 59, 54, 48, 53, 59, 60, 70, 59, 75, 59, 53, 60, 62, 61, 64, 72, 72, 70.
Noon	91, 87, 86, 85, 93, 102, 105, 110, 105, 80, 90, 94, 94, 101, 100, 101, 99.
4 P.M.	82, 89, 84, 88, 96, 104, 103, 107, 94, 85, 94, 101, 97, 100, 101, 100, 97, 98.
9 P.M.	72, 73, 61, 60, 67, 77, 78, 83, 89, 73, 64, 79, 72, 70, 76, 81, 78, 72, 72.
Humidity	0·551, 0·710, 0·668, ·710, ·653, ·556, ·614, ·276, ·442, ·581, ·753, ·432, ·610, ·522, ·501, ·373, ·454, ·710, ·580.

Observations.—Feb. 21. Great scarcity of water; the ponds as dry as a market-place.—Feb. 22. Intense heat and excessive drought; so great as to cause the bull-dog to perish.

Plants observed in flower or in full vegetation.—Imperata arundinacea, Panicum lævinode, Bromus australis, Andropogon sericeus, Erianthus, Lythrum salicaria, Morgania floribunda, Senecio brachylænus, Brachycome, Lotus lævigatus, Ethulia Cunninghami, Nicotiana suaveolens, Minuria heterophylla, Fugosia, Atriplex nummularia, Kochia brevifolia, Keraudrenia integrifolia, Sclerolæna, Goodenia geniculata, Calotis scapigera, Capparis Mitchellii, Rutidosis helichrysoides, Helichrysum bracteatum.

III. Latitude about 31° S.—Elevation under 634 feet.

March 5 *to March* 26.

	°
Sunrise	61, 68, 47, 66, 75, 77, 55, 51, 71, 70, 73, 43, 47, 53, 57, 55, 56, 53, 51, 48, 72, 47.
Noon	100, 96, 97, 98, 99, 102, 105, 95, 100, 103, 84, 86, 87, 90, 100, 97, 95, 95, 89, 90.
4 P.M.	102, 102, 97, 102, 105, 107, 102, 107, 100, 102, 86, 87, 91, 96, 96, 101, 101, 98, 99, 101, 91, 95.
9 P.M.	79, 83, 69, 81, 83, 76, 75, 70, 71, 81, 65, 62, 62, 69, 71, 70, 72, 72, 70, 74, 60, 69.
Humidity	·503, ·482, ·527, ·713, ·681, ·784, ·452, ·640, ·744, ·750, ·765, ·670, ·563, ·657, ·640, ·781, ·745, ·745, ·708, ·552, ·668, ·621.

Observations.—March 6. One bullock killed, and the others nearly exhausted, with intense heat and consequent drought.—March 8. Cattle much exhausted by thirst.—March 14. Abundance of grass and water.—March 15. The sand amongst the scrubs so soft and yielding that the draught animals were much exhausted, and one died.—March 17. The plains evidently

sometimes so saturated with water as to be rendered wholly impassable for wheel carriages, or even horses.

Plants observed in flower or full vegetation.—Angophora lanceolata, Acacia stenophylla, Brunonia simplex, Helichrysum ramosissimum, Solanum, Asclepias, Polygonum junceum, Callitris, Anthistiria membranacea, Trichinium alopecuroideum and lanatum, Cyperus, Kochia lanosa, Triraphis mollis, Dactyloctenium radulans, Justicia media, Panicum lævinode, Eucalyptus pulverulenta, Haloragis glauca, Kochia villosa, Callitris pyramidalis, Jasminum lineare, Anthericum bulbosum, Canthium oleifolium, Chenopodium auricomum, Pittosporum salicinum, Kyllingia monocephala, Santalum oblongatum, Loranthus linearifolius and aurantiacus, Eremophila Mitchellii, Geijera parviflora, Enchylæna tomentosa, Capparis lasiantha, Amaranthus undulatus, Abutilon graveolens?

IV. Latitude about 29° S.—Elevation between 484 & 766 ft.

March 27 to April 22.

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SUNRISE .	70, 56, 48, 42, 42, 44, 39, 35, 33, 37, 44, 47, 61, 63, 44, 47, 68, 47, 68, 64, 71, 62, 61, 48, 65, 41.
NOON . .	90, 78, 75, 75, 90, 93, 90, 95, 97, 91, 94, 94, 99, 102, 104, 100, 104, 86, 95, 76, 76.
4 P.M. . .	89, 82, 81, 83, 83, 79, 76, 77, 88, 94, 96, 97, 94, 97, 97, 104, 101, 101, 103, 105, 93, 93, 77, 77.
9 P.M. . .	70, 61, 51, 61, 61, 60, 50, 49, 53, 57, 63, 69, 66, 63, 66, 69, 74, 67, 72, 71, 68, 71, 63, 63, 60, 61.
HUMIDITY .	·640, ·751, ·760, ·797, ·797, ·710, ·759, ·807, ·662, ·796, ·712, ·527, ·853, ·946, ·652, ·693, ·611, ·767, ·784, ·823, ·810, ·709, ·798, ·753, ·563, ·751.

Observations.—April 4. Country liable to be rendered impassable, had the rains set in. Mr. Kennedy blinded from the effect of heat.—April 16. Great scarcity of water.—April 20. Horses exhausted by the heat and the heavy sand.

Plants observed in flower or full vegetation.—Polygonum junceum, Fusanus acuminatus, Phyllanthus, Sesbania, Chenopodium auricomum, Cucumis pubescens, Acacia pendula, Andropogon, Casuarina, Flaveria australasica, Capparis lasiantha, Exocarpus aphylla, Cyperus, Santalum oblongatum, Anthistiria, Psoralea eriantha, Indigofera hirsuta, Crotalaria Mitchellii, Arundo Phragmites, Loranthus, Adriania heterophylla, Cleome flava, Ambrina carinata, Eucalyptus populifolius, Salsola australis, Psoralea eriantha, Acacia varians.

V. Latitude about 28° S.—Elevation between 432 & 786 ft.

April 23 to May 3.

	°
Sunrise .	49, 38, 65, 63, 37, 39, 36, 27, 26, 47, 45.
Noon . .	70, 78, 69.
4 P.M. . .	66, 78, 72, 69, 63, 65, 67, 62, 68.
9 P.M. . .	47, 59, 64, 56, 57, 48, 47, 43, 48, 57, 45.
Humidity .	·647, ·842, ·946, ·844, ·801, ·865, ·804, ·865, ·863.

Observations.—April 24. Scarcity of water; river bed dry and full of sand.—April 28. Large reaches, full of water, and the country covered with luxuriant grass.

Plants observed in flower or full vegetation.—Exocarpus spartea, Loranthus aurantiacus, Casuarina, Mimosæ, Anthistiria, Indigofera hirsuta, Moschosma polystachyum, Panicum lævinode, Perotis rara, Angophora, Nymphæa.

VI. Latitude about 27° S.—Elevation between 624 & 1563 feet. (May 13.)

May 4 to June 7.

	°
Sunrise .	25, 19, 20, 48, 20, 28, 22, 30, 26, 35, 38, 27, 29, 40, 46, 53, 27, 12, 11, 17, 20, 34, 47, 22, 18, 11, 16, 16, 24, 30, 36.
Noon . .	70, 76, 81, 75, 82, 78, 73, 48, 54, 54, 52, 65, 70, 72, 79, 85, 60, 64, 67, 69, 75.
4 P.M. . .	70, 67, 68, 68, 74, 76, 59, 59, 64, 80, 82, 83, 75, 78, 76, 45, 55, 55, 56, 67, 68, 71, 68, 79, 63, 64, 67, 66, 70, 76, 85.
9 P.M. . .	37, 47, 30, 30, 38, 35, 52, 43, 48, 43, 49, 49, 57, 65, 45, 30, 27, 32, 30, 38, 44, 59, 65, 31, 30, 30, 34, 40, 43, 50, 70.
Humidity .	·764, ·703, ·934, 596.

Observations.—May 5. Very cold and extremely dry atmosphere.—May 7. Scarcity of water.—May 8. Intensely cold; atmosphere so dry as to prevent hoar frost.—May 10. Water scarce.—May 16. Excessive drought, and scarcity of water.—May 20. Season very dry; this day the coldest as yet experienced during the journey.—May 22. The river frozen, and the grass white with hoar-frost.—May 27. Abundance of water.—June 7. A fine chain of ponds, containing abundance of water, and surrounded with luxuriant herbage.

Plants observed in flower or full vegetation.—Anthistiria, Mimosa, Eucalyptus, Calandrinia balonensis, Polygonum acre, Acacia pendula, thorny bushes, Delabechea rupestris, Eucalyptus viminalis, Loranthus nutans, Callitris pyramidalis, Xerotes leuco-

cephala, Ficus, Acacia conferta, Xanthorrhœa, Triodia pungens, Panicum lævinode, Acacia stenophylla and decora, Sporobolus pallidus, Dodonæa hirtella.

VII. Latitude about 26° S.—Elevation between 1190 and 2783 feet.

June 8 *to June* 29.

	° ° ° ° ° ° ° ° ° ° ° ° ° °
SUNRISE .	36, 56, 30, 38, 20, 49, 52, 30, 43, 36, 56, 50, 54, 27, 26, 21, 12, 14, 20, 25, 25.
NOON . .	74, 57, 55, 69, 69, 52, 54, 51, 50, 48.
4 P.M. . .	85, 70, 75, 73, 54, 57, 58, 63, 65, 67, 55, 50, 49, 51, 47, 55, 68.
9 P.M. . .	70, 50, 39, 38, 60, 48, 38, 46, 54, 61, 55, 61, 57, 59, 40, 29, 22, 37, 29, 25, 53.

Observations.—June 11. A chain of ponds, and plenty of water; country consisted of open forest, and contained grass in great abundance.—June 13. Water-courses dry.—June 16. Scarcity of water.—June 17. Suffering excessively with thirst, having found no water for two days.—June 18. Drizzling rain. June 19. Heavy dews falling at night refreshed the grass: found sufficient water in a deep hole in a rock.—June 20–21. Great scarcity of water.—June 24. Very cold and extreme drought. —June 26. Ponds containing plenty of water.—June 27. A quantity of water-springs.

Plants observed in flower or full vegetation.—Acacia pendula, Callitris, Delabechea, Geijera parviflora, Rosewood acacia, Tristania angustifolia, Acacia holosericea, Teucrium argutum, Xerotes leucocephala, Phebalium glandulosum, Alphitonia excelsa, Adiantum hispidulum and assimile, Acacia ixiophylla and Cunninghamii, Exocarpus, Eucalyptus populifolia, Zamias, Nothochlæna distans, Grammitis rutæfolia, Hovea lanceolata, Sphæranthus hirtus, Grevillea floribunda, Doodia caudata, Solanum furfuraceum, Dodonæa mollis, Sida, Myoporum Cunninghamii, Solanum ellipticum.

VIII. Latitude about 25° S.—Elevation between 2041 and 908 feet.

June 30 *to July* 20.

	° ° ° ° ° ° ° ° ° ° ° ° ° °
SUNRISE .	44, 14, 43, 16, 16, 23, 18, 14, 23, 18, 11, 23, 19, 21, 25, 29, 31, 34, 40.
NOON . .	68, 60, 50, 50, 58, 67, 65, 65, 68, 66.
4 P.M. . .	65, 61, 49, 49, 49, 58, 54, 62, 65, 65, 68, 66, 65, 69, 61, 73.
9 P.M. . .	38, 38, 26, 38, 38, 38, 25, 25, 48, 29, 30, 35, 40, 49, 44, 41, 43, 44, 47, 62.

Observations.—June 30. Copious water springs.—July 2. A large spring, and water in a rock.—July 4. Quantity of heavy rain fell.—July 5. Another frosty night succeeded the day of rain, and froze our tents into boards not easy to be packed.—July 6. Fell in with a fine stream, flowing and full of sparkling water to the margin, doubtless the product of many springs, surrounded with fertile vegetation, giving a charming appearance to the whole country.—July 8. Lacking water.—July 11. Plenty of water, and fine open forest of surpassing beauty.—July 14. A deep grassy valley, open and inviting, containing large ponds of water.—July 18. Encamped in a valley containing abundance of grass, and water was found in a chain of adjoining ponds.

Plants observed in flower or full vegetation.—Erythrina Vespertilio, Acacias, Ficus, Plumbago zeylanica, Triodia pungens, Dodonæa triangularis, Capparis loranthifolia, Acacia podalyriifolia and falcata, Eremophila Mitchellii, Stenochilus curvipes, Cryptandra propinqua, Acacia decora (var. macrophylla), Bursaria incana, Loranthus subfalcatus, Boronia bipinnata, Acacia excelsa, Erechthites arguta, Leucopogon cuspidatus, Acacia pendula, Anthistiria australis, Panicum lævinode, Callistemon nervosum, Eucalyptus melissiodora, Eucalyptus citriodora, Daucus brachiatus, Myoporum Cunninghamii, Acacia podalyriæfolia, Dodonæa trigona, Aotus mollis, Geijera latifolia, Ajuga australis, Platyzoma microphyllum, Brunonia sericea, Hardenbergia monophylla, Suæda tamariscina, Dodonæa filifolia, Delabechea.

IX. Latitude about 24° S.—Elevation between 1211 and 1242 feet.

July 21 *to July* 24.

	°	°	°	°
Sunrise .	57,	49,	46,	56.
Noon . .	69,	74,	73,	75.
4 P.M. . .	75,	73,	80,	82.
9 P.M. . .	48,	64,	55,	66.

Observations.—July 21. Vegetation extremely checked by drought. The very grass parched and useless.—July 23. Vegetation suffering extremely from drought; very old and dry grass only could be had for the cattle.—July 24. Much thunder and heavy rain.

Plants observed in flower or full vegetation.—Salsolaceous bushes, Acacia scrub.

X. Latitude about Tropic of Capricorn.—Elevation between 1201 and 1098 feet.

July 25 to July 27.

	°	°	°
SUNRISE .	45,	39,	43.
NOON . .	77,	79,	83.
4 P.M. . .	85,	89,	90.
9 P.M. . .	53,	75,	53.

Observations.—July 26. In the river-bed plenty of water; green shoots of grass springing, the product of recent rain.—July 27. Plains of good grass, containing ponds filled with water.

Plants observed in flower or full vegetation.—Rosewood Acacia, Callitris, Casuarina, a singular Euphorbiaceous plant with great woolly leaves, Dodonæa tenuifolia.

XI. Latitude about 23° S.—Elevation between 539 and 1075 feet.

July 28 to August 7.

	°	°	°	°	°	°	°	°	°	°
SUNRISE .	44,	38,	54,	52,	23,	29,	21,	23,	39,	30.
NOON . .	82,	80,	82,	70,	65,	61,	59,	58,	64,	78.
4 P.M. . .	88,	85,	83,	69,	69,	69,	64,	63,	61,	77.
9 P.M. . .	58,	51,	45,	43,	44,	40,	37,	29,	36,	55.
HUMIDITY .	·457,	·010,	·487,	·707.						

Observations.—July 29. Trees much affected by unseasonable drought, or past heat.—Aug. 5. Great scarcity of water.—Aug. 7. Found large ponds full of pure water.

Plants observed in flower or full vegetation.—Loranthus subfalcatus, Triodia pungens, Cassia heteroloba, Geijera pendula, Stenochilus salicinus, Myoporum, Callitris, Casuarina, Alternanthera, Acacia Farnesiana, holosericea and Simsii, Loranthus nutans, Eurybia subspicata, Capparis umbonata, Acacia delibrata and leucadendron, Trichodesma sericeum, Velleya macrocalyx, Stenochilus curvipes, Jacksonia ramosissima, Hibiscus, Cassia coronilloides, Monenteles redolens, Melaleuca tamariscina, Grevillea Mitchelli, Stenochilus pubiflorus, Euphorbia hypericifolia, Dodonæa vestita.

XII. Latitude about 22—21½° S.—Elevation 629 feet.

August 8 to August 11.

	°	°
SUNRISE .	59,	36.
NOON . .	82,	71.
4 P.M. . .	81,	70.
9 P.M. . .	62,	35.
HUMIDITY .	·843,	·641.

Observations.—Aug. 8. Scarcity of grass and water.—Aug. 10. River very deep, and full of water. The atmosphere was extremely moist.

Plants observed in flower or full vegetation.—Panicum lævinode, Acacias, Callistemon nervosum, Eucalyptus, Loranthus, Cassia heteroloba, Calotis cuneifolia, Pittosporum lanceolatum, Geijera latifolia, Stenochilus pubiflorus, Dodonæa acerosa, Labichea digitata.

XIII. Latitude about 23° S.—Elevation between 610 and 908 feet.

August 12 *to August* 21.

	°	°	°	°	°	°	°
Sunrise .	37,	56,	57,	58,	55,	51,	45.
Noon . .	70,	61,	64,	65,	71,	54,	63.
4 P.M. . .	71,	60,	66,	63,	74,	53,	63.
9 P.M. . .	65,	60,	60,	63,	68,	47.	
Humidity .	·893,	·712,	·726,	·804.			

Observations.—Aug. 13. River containing abundance of clear water.—Aug. 14. Drizzling rain, with an easterly wind, and high barometer. An unpleasant smell prevailed everywhere this day, resembling that from a kitchen sewer or sink. Whether it arose from the earth, or from decayed vegetable matter upon it, I could not form any opinion.—Aug. 18. Heavy rain, turning the surface of the ground around the tents into mud almost knee-deep.—Aug. 21. Abundance of water, and luxuriant herbage.

Plants observed in flower or full vegetation.—Grevilleas, Melaleuca trichostachya, Stenochilus bignoniæflorus, Indigofera, Anthistiria, Geijera parviflora, Eremophila Mitchellii, fine forest trees, Acacia scrub, terrestrial lichens, various rare trees and plants.

XIV. Latitude about Tropic of Capricorn.—Elevation 908 feet.

August 22 *to August* 24.

	°	°	°
Sunrise .	25,	28,	29.
Noon . .	69,	73,	75.
4 P.M. . .	72,	75,	76.
9 P.M. . .	43,	44,	46.
Humidity .	·795,	·796,	·745.

Observations.—Aug. 23. Abundance of water.—Aug. 24. Grass and water in abundance.

Plants observed in flower or full vegetation.—Capparis, various flowers, Acacia scrub, many trees and shrubs putting forth buds.

XV. Latitude about 24° S.—Elevation between 1225 and 1316 feet.

August 25 *to September* 4.

	° ° ° ° ° ° ° ° ° °
Sunrise .	48, 37, 41, 40, 39, 59, 25, 28, 31, 26.
Noon . .	76, 80, 79, 81, 70, 83, 67, 73, 74, 67.
4 P.M. . .	77, 81, 82, 76, 82, 81, 73, 78, 75, 65.
9 P.M. . .	52, 44, 48, 49, 56, 62, 44, 47, 52, 39.
Humidity .	·709, ·739, ·516, ·560, ·706, ·632, ·739, ·696, ·468, ·535.

Observations.—Aug. 27. Scarcity of water.—Aug. 31. Heavy showers of rain.—Sept. 4. Verdant pastures springing.

Plants observed in flower or full vegetation.—Cassia zygophylla, Acacia pendula, doratoxylon, conferta, macradenia, decora, and triptera, Hovea leiocarpa, Podolepis acuminata, Bossiæa carinalis, Bertya oleæfolia, Prostanthera odoratissima, Dodonæa nobilis and vestita, Myoporum Cunninghami, Pittosporum lanceolatum, Tecoma Oxleyi, Anthistiria, Panicum lævinode, Eriostemon rhombeum, Eurybia subspicata, Bossiæa rhombifolia, Loranthus subfalcatus.

XVI. Latitude about 25° S.—Elevation between 618 and 2523 feet.

September 5 *to October* 10.

	° ° ° ° ° ° ° °
Sunrise .	33, 33, 53, 39, 60, 58.
Noon . .	68, 68, 55, 77, 87, 90, 94, 75.
4 P.M. . .	64, 64, 57, 70, 76, 82.
9 P.M. . .	40, 40, 50, 52, 64, 62.
Humidity .	·495, ·495, ·759, ·616, 1·000, ·843.

Observations.—Sept. 10. Scarcity of water, but good grass.—Sept. 13. Suffering with thirst and intense heat.—Sept. 14. Large ponds of water, surrounded with verdant pasture.—Sept. 15. Intense heat.—Sept. 16. Fine downs and plains covered with the finest grass.—Sept. 17. The grass surpassed any I had seen in the colony in quality and abundance.—Sept. 19. Verdant pasture, little water, and intense heat.—Sept. 21. Sufficient water, air sultry.—Sept. 22. Boundless plains covered with luxuriant herbage, forming the finest region I had ever seen in Australia. Sept. 23. Intense heat.—Sept. 25. Excessive heat.—Oct. 1. Scarcity of water, intense heat.—Oct. 7. Intense heat.—Oct. 9. Thunder and heavy rain.

Plants observed in flower or full vegetation.—Chloanthes stæchadis, Acacia Cunninghamii, Cryptandra propinqua, Calytrix, Boronia eriantha, Leptospermum sericatum, Aotus mollis,

Choretrum, Callitris glauca, Acacia longispicata, Morgania glabra, Eremophila Mitchellii, Polygonum, Frankenia scabra and serpyllifolia, Haloragis aspera, Panicum lævinode, Acacia pendula, Solanum, Salsolas, Mesembryanthemum, Rosewood Acacias, Capparis, Erianthus, Danthonia pectinata, Pappophorum gracile and avenaceum, Acacia Victoriæ, Xerotes leucocephala and multiflora, Bossiæa carinalis, Ajuga australis, Indigofera australis, Dodonæa hirtella, Evolvulus linifolius, Goodenia pulchella, Hibbertia canescens, Dampiera adpressa, Eucalyptus, Labichea digitata, Jacksonia scoparia, Grevillea longistyla, Zieria Frazeri, Dodonæa mollis, Leucopogon cuspidatus, Pimelea, Hovea lanceolata, Pomax hirta, Acacia viscidula, Boronia bipinnata, Dodonæa peduncularis, Schidiomyrtus tenellus, Linschotenia discolor, Dodonæa acerosa, Triodia pungens, Brunonia sericea, Dianella strumosa, Alternanthera, Tabernæmontana, Acacia uncifera, Logania cordifolia, Rutidosis arachnoidea, Grevillea juncifolia, Keraudrenia integrifolia, Conospermum sylvestre and sphacelatum, Labichea rupestris, Micrantheum triandrum, Dodonæa pubescens, Acacia pinifolia, Grevillea longistyla, Actinotus Helianthi, Commelina undulata, Thysanotus elatior, Plectranthus parviflorus, Vigna lanceolata, Pilotheca ciliata, Lotus australis, Acacia podalyriæfolia, Gompholobium foliolosum, Hakea purpurea, Euphorbia eremophila.

XVII. Latitude about 26° S.—Elevation between 2523 and 1191 feet.

October 11 *to October* 17.

	°	°	°	°	°	°	°
Sunrise .	54,	42,	63,	60,	45,	37,	32.
Noon . .	80,	87,	79,	71,	64,	70,	78.
4 P.M. . .	88,	96,	76,	66,	67,	76,	79.
9 P.M. . .	57,	78,	64,	52,	57,	51,	60.
Humidity .	·749,	·409,	·725,	·761,	·667,	·534,	·417.

Observations.—Oct. 13. Air sultry; the ponds that were exposed dried up, but some few in the rocks found to contain water.—Oct. 15. Great fall of temperature, with keen wind.—Oct. 17. Very cold.

Plants observed in flower or full vegetation.—Helipterum anthemoides, Imperata arundinacea, Vigna lanceolata, Swainsona phacoides, Rubus parvifolius, Eriostemon rhombeum, Notelæa punctata, Phillyrea, Plantago varia, Daucus brachiatus, Nicotiana suaveolens, Acacia pendula, Pycnosorus globosus, Ruellia australis, Acacia spectabilis, Hovea leiocarpa, Convolvulus erubescens, Myriogyne racemosa, Triphasia glauca.

XVIII. Latitude about 27° S.—Elevation between 1295 and 832 feet.

October 18 *to* *October* 29.

	°	°	°	°	°	°	°	°	°	°	°	°
Sunrise .	38,	46,	39,	48,	47,	48,	53,	43,	56,	59,	61,	36.
Noon . .	83,	81,	56,	85,	81,	91,	85,	81,	83,	68,	75,	68.
4 p.m. . .	86,	75,	87,	84,	85,	93,	83,	94,	93,	95,	76,	73.
9 p.m. . .	64,	50,	67,	65,	70,	65,	58,	65,	75,	77,	60,	49.

Humidity . ·396, ·813, ·445, ·493, ·495, ·524, ·528, ·469, ·452, ·556, ·595, ·517.

Observations.—Oct. 18. Abundance of water.—Oct. 27. River bed contained large reaches of water.—Oct. 28. Heavy rain.—Oct. 29. River bed quite dry; surrounding country clothed with rich verdure.

Plants observed in flower or full vegetation.—Jasminum suavissimum, Brachychiton populneum, Sterculia heterophylla, Pimelea trichostachya, Calandrinia balonensis, Eurybiopsis macrorhiza, Eurybia subspicata, Acacia decora, Goodenia coronopifolia, Convolvulus erubescens, Boronia bipinnata, Calotis, Senecio carnosulus, Asperula, Myoporum dulce, Veronica plebeia, Leucopogon, Brunonia, Nyssanthes, Salsola australis, Xerotes decomposita, Pappophorum virens, Acacia macradenia, Calandrinia pusilla, Erodium, Prostanthera euphrasioides, Helipteres glutinosa, Leptocyamus latifolius, Sida virgata and filiformis, Dodonæa peduncularis, Ranunculus sessiliflorus, Xerotes laxa, Justicia media, Evolvulus linifolius, Goodenia flagellifera, Chloanthes stæchadis, Acacia spectabilis, pennifolia, and Cunninghamii, Carissa ovata, Cassia zygophylla, Sida pisiformis, Keraudrenia integrifolia, Leptocyamus latifolius, Pomax hirta, Eremophila Mitchellii, Dodonæa acerosa, Helichrysum, Pimelea colorans, Stackhousia muricata, Podolepis longipedata, Solanum biflorum, Ranunculus plebeius, Pleurandra, Ruellia australis, Pittosporum salicinum, Cassytha pubescens, Vigna lanceolata, Xerotes longifolia, Anthericum bulbosum, Geranium parviflorum, Helipterum anthemoides, Neptunia gracilis, Brunonia sericea, Sida, Mentha grandiflora, Prostanthera ringens, Swainsonia phacoides, Pleurandra cistoidea, Trichinium conicum, Hibiscus Sturtii, Daviesia filipes, Geijera pendula, Capparis lasiantha, Lappago, Pterostylis Mitchellii, Kennedya procurrens, Danthonia triticoides, Jasminum Mitchellii, Solanum violaceum, Laxmannia gracilis, Erythræa australis, Dianella rara, Salvia plebeia, Papaver, Swainsonia coronillæfolia, Crotalaria dissitiflora, Sida Frazeri, Clematis stenophylla, Ventilago viminalis, Acacia pendula, Callitris, Casuarina, Adriania acerifolia, Acacia varians.

XIX. Latitude about 28° S.—Elevation between 819 and 969 feet.

October 30 *to November* 6.

	° ° ° ° ° °
Sunrise .	34, 33, 50, 51, 44, 44.
Noon . .	70, 81, 76, 85, 76, 76.
4 P.M. . .	78, 84, 79, 86, 85, 85.
9 P.M. . .	60, 51, 63, 66, 71, 71.
Humidity .	·443, ·575, ·893, ·525, ·550, ·550.

Observations.—Nov. 2. Abundance of water.—Nov. 4. River Balonne filled with water; its banks verdant with a luxuriant crop of grass.

Plants observed in flower or full vegetation.—Cymbidium canaliculatum, Jasminum Mitchellii, Justicia adscendens, Melaleuca trichostachya, Andropogon bombycinus, Cæsia occidentalis, Hedyotis, Calocephalus gnaphalioides, Goodenia flagellifera, Fusanus acuminatus.

XX. Latitude about 29° S.—Elevation under 650 feet.

November 7 *to December* 9.

	° ° ° °
Sunrise .	62, 58, 58, 61.
Noon . .	103, 102, 102, 62.
4 P.M. . .	104, 103, 104, 57.
9 P.M. . .	81, 76, 75, 53.
Humidity .	·505, ·553, ·553, 1·000.

Observations.—Nov. 9. Suffering from excessive heat.—Nov. 15. Heat so intense as to kill one of the horses.—Nov. 17, 18. Extreme heat.—Nov. 21, 22. Abundance of rain.—Nov. 28. Flood increased so fast as to oblige the party to remove their camp.—Dec. 7. Heavy thunder-shower fell.—Dec. 9. Heavy thunder-storm.

Plants observed in flower or full vegetation.—Swainsonia coronillæfolia, Fusanus acuminatus, Elæodendron maculosum, Goodenia pulchella, Atriplex nummularia, Grewia, Trichinium fusiforme, Melicytus oleaster, Myriophyllum verrucosum, Cassia coronilloides, Myoporum dulce, Elæodendron, Cassia circinata, Morgania floribunda, Indigofera brevidens, Acacia pendula and neriifolia, Canthium, Evolvulus, Hibiscus Sturtii, Crotalaria dissitiflora, Stenochilus bignoniæflorus, Tricoryne elatior, Fugosia, Morgania glabra, Acacia varians, Anthericum bulbosum, Catha Cunninghamii, Vigna suberecta, Hylococcus sericeus, Acacia spectabilis, Helichrysum semipapposum, Beyeria, Cassia, Thouinia australis, Eucalyptus bicolor and acuminata, Sida tubulosa, Didiscus pilosus, Boerhaavia, Carissa ovata, Neptunia gracilis.

XXI. Latitude about 30° S.—Elevation under 590 feet.

December 10 *to December* 14.

	° ° °
6 A.M. . .	68, 67, 76.
7 A.M. . .	70.
10 A.M. . .	70.
6 P.M. . .	88.
7 P.M. . .	87.

Observations.—Dec. 14. Heavy rain.

Plants observed.—Cyclogyne Swainsonioides, Canthium oleifolium, Malva ovata, Thysanotus elatior, Hakea longicuspis, Morgania glabra, Heterodendron oleæfolium, Polymeria longifolia.

The reader will doubtless be surprised to find how low a temperature was occasionally observed on this journey. In the end of April (our October) in latitude 28° S., within 4½° of the Tropic, at an insignificant elevation, the thermometer stood at 26° at sun-rise, and was as low as 43° at nine P. M.; nevertheless, the country produced wild Indigo, Mimosas, Casuarinas, arborescent Myrtleblooms, and Loranths. A degree nearer the Tropic in May (our November) the thermometer at sun-rise marked 20°, 19°, 18°, 17°, 16°, 12°, and on two separate days even 11°! On the 22nd of May the *river was frozen*, and yet herbage was luxuriant, and the country produced Mimosas, Eucalypti, Acacias, the tropical Bottle-tree (Delabechea), a Calandrinia, and even a Loranth. On the 23rd of May, the thermometer at sun-rise marking 12°, Acacia conferta was coming into flower, and Eucalypti, with the usual Australian vegetation, were abundant. On the 30th of May, at the elevation of 1118 feet, the almost tropical Delabechea was found growing, with the temperature at sun-rise 22° and at nine P.M. 31°, so that it must have been exposed to a night's frost gradually increasing through 12°. And this was evidently the rule during the months of May, June, and July (our November, December, and January); in latitude 26° S. among Tristanias, Phebaliums, Zamias, Hoveas, Myoporums, and Acacias, the evening temperature was observed to be 29°, 22°, 37°, 29°, 25°, falling during the night to 26°, 21°, 12°, 14°, 20°; in latitude 25° S. the tents were frozen into boards at the elevation of 1421 feet, the thermometer, July 5, sunk during the night from 38° to 16°, and there grew Cryptandras, Acacias, Bursarias, Boronias, Stenochiles, and the like. Cymbidium canaliculatum, the only orchidaceous epiphyte observed, was in flower under a night temperature of 33° and 34°; that by

day not exceeding 86°. These facts throw quite a new light upon the nature of Australian vegetation.

It may be supposed that so low a temperature must have been accompanied by extreme dryness, and such appears to have been usually the case. Nevertheless, it cannot have been always so, for although we have no hygrometrical observations for June and July, and only four for May, yet there is other evidence to show that the dryness cannot always have been remarkable. In May the hygrometer indicated ·764, ·703, ·934, or nearly saturation, and ·596; yet the sun-rise temperature was on those occasions 25°, 28°, 30°, and 34°. On the 22nd of May the grass was white with hoar frost, and then the thermometer was at sun-rise 20° under canvas and 12° in the open air; and on the 5th of July, when it rained all day and the tents were "frozen into boards," the thermometer sank during the night from 38° to 16°.

It is probable that this power of resisting cold is connected with the very high temperature to which Australian vegetation is exposed at certain seasons, and this is horticulturally a most important consideration. We find that in latitude 32° S. in January (our July) the thermometer stood eight days successively above 100°, and even reached 115° at noon; that it was even as high as 112° at four P.M.; that in the latter part of February one degree nearer the line it was twice 105° and once 110°; that in March one degree further northward it frequently exceeded 100°, and there was not much fall in this excessive temperature up to the end of April. This will be more evident from the following

TABLE OF NOON-DAY TEMPERATURES.

Latitude.			Maximum.	Minimum.
°		°	°	°
29 S.	Nov., Dec.	Average of 3 Observ. . 102	103	62
32 S.	Jan., Feb.	,, 18 ,, . 97½	115	73
31 S.	Feb., March	,, 17 ,, . 90	110	80
30 S.	March . .	,, 20 ,, . 95	105	84

At this time the dryness must also be excessive, as will have been seen by Sir Thomas Mitchell's observations.*

Even such heats as these do not, however, destroy the power

* The humidity of the atmosphere, as indicated by a wet bulb thermometer, does not, however, give such a degree of dryness as might have been anticipated; but it is to be suspected that some errors may have crept into this part of the Journal.

of vegetation, for we find in the midst of them all sorts of trees in blossom, a few bulbs, and even here and there (in damp places, no doubt) such soft herbs as Goodenias, Trichiniums, Helichrysum, Didiscus, Teucrium, Justicia, herbaceous Jasmines, Tobacco, and Amaranths.

During these heats the night-temperature seldom remains high. Sometimes, indeed, the thermometer was observed as much as 88° and once even 97° at sun-rise, the average noon-heat of the month being 97½°, but generally the temperature is lower. Thus:—

				Temperature occasionally at Sunrise.
Nov. and Dec., .	averaging	102°	at noon .	62°, 58°, 61°.
Jan. and Feb. .	,,	97½°	,, .	61°, 60°, 59°, 47°, &c.
Feb. and March .	,,	90°	,, .	61°, 59°, 54°, 48°, &c.
March . . .	,,	95°	,, .	68°, 55°, 51°, 47°, &c.

To this point the attention of cultivators must be carefully directed.

I think it is impossible to doubt, from the observations thus referred to, that high winter temperature in hot-houses is a great mistake, and that the practice of gardeners requires, in this respect, to be very carefully reconsidered.

XXXV.—*On the Cultivation of Celery.* By Robert Errington, Gardener to Sir P. de Malpas Grey Egerton, Bart., M.P., F.H.S., Oulton Park, Tarporley, Cheshire.

(Communicated August, 1848.)

It is well known in these exhibition days that much of the gigantic celery which finds its way to market, or appears at our public exhibitions, is (although so specious in appearance) exceedingly coarse and fibrous. It moreover has a constant tendency to "run to seed" before even winter sets in; and then of course loses that delicate tenderness of texture for which celery is so much esteemed. Now although it is quite commendable to encourage size at an exhibition, it does not follow that the mode employed to produce such enormous stalks must be implicitly followed by those whose office it is to provide choice salads for the wealthy, whose taste in matters of the kind is not always identical with that of the inhabitants of busy towns; the latter in their marketing matters not unfrequently prefer bulk to quality.

I presume it will be readily conceded that rapid growth is the principle which most conduces to tenderness in vegetables; and that any mode of culture which produces an unusual bulk of

material through very early sowing, must, in a proportionate degree, deteriorate the character of the production. One of the first points to which I would respectfully direct attention in order to obtain tender, crisp, and good keeping celery, is to sow it much later than usual, and to cultivate it very highly afterwards; never if possible suffering it to receive a check of any kind. A very small sowing, to obtain a little very early celery, may be made in the early part of February; but for the principal supply the beginning of April will suffice, provided the maxim be put in full practice.

This plant is such a gross feeder, that mere soil in the seed-bed, be it ever so good, will not suffice alone to carry out these principles. It should always be sown in contact with a thin layer of very rotten manure; and above all things kept constantly moist. It is, moreover, generally sown much too thick; and this frequently arises from the want of frame-room; most gardeners preferring to sow it in a hot-bed frame. There is, however, no absolute necessity to rear it in a frame if sown as here recommended: I have raised my main crops for years—even in this northern climate—on open but elevated beds in the open garden. True it is the young plant requires some nursing, and much attention in guarding it from the snails and slugs; this, however, presents no obstacle worth consideration.

My practice is to apply liquid manure occasionally to this late sowing; or at all events to keep the beds constantly moist. The importance of an abundant supply of moisture is pretty well known—especially during hot weather, when it is barely possible to keep it too wet. This was long since shown by the late Mr. Knight, who, taking into consideration the circumstance of its being, as to its native habits, a ditch plant, shaped his course of culture accordingly.

As soon as the young plant can be handled with convenience, transplanting must take place; and this part of the cultivation must be performed with much care. Elevated beds should be had recourse to as a guarantee against battering storms, the young plant being exceedingly liable to "choke" during heavy rains. These beds should be thoroughly pulverised, and after this process—being duly marked out—a coating of rotten manure should be spread over the surface, two inches in thickness, and a casing of the ordinary soil strewn over this, about an inch in thickness.

The soil being neatly levelled, a light roller may be passed over the bed, in order to make a close and even surface; or in default of a roller, the soil may be patted with the spade; this precaution will prevent injury from storms. By a kindly attention the plants will be ready for final transplanting in about a

month, and no delay must be permitted in this matter, as it is well known in these days that a sudden check after very rapid growth induces the formation of blossom; or, in technical terms as applied to the celery, causes the plant to "run." The smaller the plant therefore at this removal the better, provided it is stout and of a dark-green colour.

The mode of culture in drills, or by the Scotch bed mode, is so well known, that I need say nothing here on that head; some persons prefer the one mode, some the other. This, however, depends in part on the scheme of rotation pursued; and for my part I prefer the Scotch or bed mode; for, strange to say, I take my main crop of peas off the ground intended for celery previously. The peas are chiefly of the Imperial class, which it is well known produce a glut, and are speedily off the ground.

By sowing two rows of peas at a time I obtain ground on the removal of each pair of rows, for a six feet celery-bed: such ground has usually been much exhausted by the Brassica tribes, previous to the peas, and I use the celery as a restoring crop.

Whatever mode be adopted, it should be borne in mind that moisture during hot weather is as necessary here as in the seed-bed. Much care is requisite in "soiling up." I have known excellent crops spoiled by neglectful labourers; and the first soiling in general determines whether it shall be straight or crooked. The principle of soiling has been much misunderstood in many instances; some persons neglecting it for a long period, and laying on a most unwarrantable load, by which the whole plant becomes suddenly paralysed.

Celery should be soiled little and often—a little once a fortnight at furthest; and the plant should be allowed a firm footing before the first soiling takes place. In the middle of November it should be soiled in an extra manner, as protection against frost, and the soil pressed very close. I consider the Manchester red the best for the earliest crop, but Seymour's white will keep the longest.

XXXVI.—*An Account of some Hybrid Melons.* By Sir G. S. Mackenzie, Bart., F.H.S.

(Communicated Aug. 22, 1848.)

The Melon is a fruit so beautiful to look upon, and so agreeable to the palate, that it is a matter of surprise it should not be more generally cultivated, and when cultivated that it should not receive due attention. For a long period I have not seen a fine Melon at any table but my own; and those brought to market are trash. This is curious; for it is as easy to cultivate good as bad varieties. More attention has of late been given to the

gratification of the eye than that of the palate; and the demand for bouquets seems to have absorbed the faculties of gardeners, and to have left fruits to the operations of chance. It may be also remarked that, unless masters and mistresses exhibit some interest in the operations carried on in the garden, and a desire to possess its products in perfection, gardeners lose heart, and become naturally careless of what their employers neglect. Many have pride in having fine gardens and forcing-houses, who know nothing whatever about gardening, and can scarcely distinguish an apple-tree from a peach-tree; and it is probable that there is less taste for horticultural pursuits evinced now than formerly. More rational pursuits than those of horticulture cannot be recommended to the young; for it requires an acquaintance with some branches of science to make a good gardener. No pursuits are more gratifying to the senses, as there is scarcely a dish sent to the dinner-table that does not owe something to the garden for its relish. Perhaps I may be somewhat too enthusiastic in this matter, as I confess I take as much interest in a turnip as in a peach, and like to have good vegetables about my piece of boiled beef, as well as fine fruit at my dessert. To revive a due taste for horticultural pursuits, to infuse more of the useful into them, as well as to gratify the eye, is not in my power; but if operative gardeners would press their employers to attend more to improvement, and to seek for the best kinds of everything desirable, and to exert themselves to procure everything of the best quality, it is probable that the value of good gardeners would be better understood, and what they produce more highly appreciated.

In order to contribute, in some small degree, to extend interest in horticulture, I now proceed to narrate the history of some Hybrid Melons, which I think will be reckoned interesting and curious, even by those who know but little of the habits with which the Creator has endowed the vegetable world for our gratification.

The chief distinction among melons is, that some have flesh coloured by various shades of red, some green flesh of different shades, and some white. The flavour of the red and green sorts is different and characteristic, and both, as well as the white, vary in the richness and agreeableness of flavour, and in juiciness; juice being generally far more abundant in the green sorts. A good many years ago it occurred to me that I might improve the red sorts by crossing with the green. Accordingly I impregnated the blossom of a red melon, the name of which has escaped me, with the Beechwood. From the seeds of the impregnated Melon A, I obtained several varieties; but I thought none worth preserving but one, which had both red and green flesh, the latter

being outermost, B. From the seeds of B, I got none with the two colours like itself, and concluded the variety would not be permanent; but two of the produce, both with pale-green flesh, were so fine as to induce me to preserve the seeds, C, D.

This season I sowed some seeds of C, and obtained two Melons, E, F, very different in external appearance. One of them, E, had a smooth buff-coloured skin, with some netting, and resembled a very fine seedling I had raised about twelve years ago, and which has proved permanent, and is named the Catherine Melon.* The fruit E had flesh of two colours, red and green, like B. The inner flesh was red, and without any defined line passed into green. The red flesh, instead of being firm like that of most of the reds, was full of rich juice. Besides being a curiosity this melon is a very fine one and a good bearer.

At the time my melon-beds were set to work, I had, unfortunately, a very ignorant gardener, whom I dismissed; but before the beds were committed to better hands almost all my plants were lost. I succeeded, however, in obtaining three ripe melons, F. Of the fruit F there was a good show. It was, externally, like the Beechwood, but of a more perfectly oval shape—a solid ellipse and netted all over. Several of these got loose from the stem before they were ripe, and one only remained, small and rather unsightly, and was neglected as of no value; nevertheless it grew apace, and attained the weight of nearly two pounds. The plant on which it grew withered away. I had forgot this solitary fruit; but looking into the frame when about to arrange it for the reception of cuttings, I put the Melon into my pocket. After dinner I produced it to some persons well accustomed to fine fruit; when I cut it I was struck with an appearance of richness, and the general exclamation was, "I never tasted so delicious a melon." So much for the neglected fruit. I do not hesitate to rank it with the Beechwood (which I reckon the standard English Melon) and the Catherine. Of the numerous varieties I have tasted, I esteem as the finest these three and the Bicolor (so the one with green and red flesh may be named), the flavour of which partakes most of that of the red sorts, while it is far more juicy. This last cannot, as yet, be declared permanent, though it is likely it may be so, since it has re-appeared after disappearing for one generation. As I do not in raising new varieties speculate for profit, I shall be happy to attend to any application for seeds from *bonâ fide* lovers of the Melon, in the hope that I may receive some account of the produce.

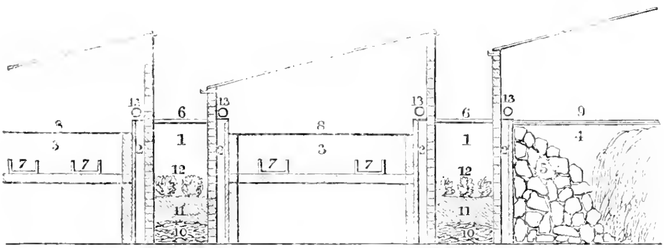
* The Catherine Melon was declared, by a Committee of the Caledonian Horticultural Society, to be equal, if not superior, to the Melons which gained the first prizes the two last years, viz. the Duke of Bedford and Irish Green-fleshed. It rivals the Beechwood.

XXXVII.—*On Forcing Seakale and Rhubarb, Blanching Winter Salads, and Protecting late Vegetables.* By James Duncan, C.M.H.S., Gardener to Joseph Martineau, Esq., F.H.S., Basing Park, near Alton.

(Communicated July 8, 1848.)

The cumbersome and unsightly mode by which seakale and rhubarb are usually produced, viz., under masses of fermenting material in the open ground, has long appeared to me an anomaly in gardening which not only involves a very serious expense in the production of these articles, but, from the changeable nature of our atmosphere during the winter months, the produce itself is rendered very uncertain, more especially during periods of continued wet or stormy weather. It also often occurs that overheating is a source of much mischief, considerably damaging the leaves, and not unfrequently destroying them altogether. Many years since, whilst under-gardener in a large establishment, at my suggestion, a close dark shed at the back of a fruiting pine-stove, and which derived a borrowed heat from that structure, was appropriated to the purpose of forcing seakale and blanching winter salads, and it answered the purpose tolerably well, although in severe weather an excess of heat was sometimes unavoidable, and of a more drying nature than was favourable to a healthy development of the leaves of those esculents. The roots were removed from the open ground and planted in a bed of mould some eight or nine inches in thickness on the floor of the shed, and no further care was required than occasionally to sprinkle the walls and floor of the building, so as in some measure to counteract the drying nature of the heat proceeding through the wall of the pine-stove. Since then I have resorted to many expedients in the production of seakale and rhubarb, such as forcing in dark frames, on the floors of vineries, and the mushroom-house, and occasionally potting the roots and forcing them in the pine-stove—preferring, in short, almost any mode of cultivation to the antiquated one of forcing with pots and manure in the open ground during the depth of winter: the only conditions necessary in these operations being to secure a sufficiency of heat and complete darkness, so as at once to insure a vigorous growth, perfectly blanched.

The system, however, which I have practised here for a series of years is at once so economical and well suited for the purposes alike of forcing rhubarb and seakale, or the blanching of endive or other salads, as at once to do away with (at least in my case) all other plans or expedients by which these vegetables had hitherto been produced.



Section of a portion of the quadruple range of forcing-pits at Basing Park, illustrative of the mode of forcing winter vegetables.

Description of Plan.

1. Pits which were formerly used for fermenting material.
2. Flue into which the steam from the lining-pits formerly passed.
3. Hot-water chamber. 4. Dung chamber.
5. Large flints, placed for the purpose of contracting the chamber.
6. Wooden covers of inch-thick larch board resting on cast-iron bearers and wooden fillets: these covers have been down thirteen years.
7. Hot-water troughs on bearers.
8. Slate bottom to the bed 1 inch thick.
9. Wooden bottom to allow the dung steam to pass into the bed.
10. Brushwood. 11. Mould. 12. Vegetables.
13. Hot-water pipes.

In a quadruple range of forcing-pits (of which the annexed section of a part of them will convey an accurate idea) the pits are situated two feet apart from each other, and were formerly heated by dung linings in the intervening spaces, which were closely covered over with wooden shutters: the latter rested on cast-iron bearers, and formed at once a walk between the pits and a means of preventing the escape of heat from the dung underneath; they also kept it from being chilled by the action of the weather. But as this system has been given up for the more modern and ready one of applying the heat in chambers underneath the beds, these lining-pits have been rendered useless for their original purpose, and I have since then applied them very successfully to the forcing of winter vegetables. They do not require any special heating, for a sufficiency of warmth is generated through the walls of the adjacent chambers. A covering of straw during periods of severe frosts is added; but this is more a precautionary measure than one of necessity. These pits are 4½ feet in depth. In the bottom of them a layer of brushwood is placed, so as to enable the heat to penetrate more readily under the roots, and to allow any excess of moisture to drain off effectually; the roots are then removed from the open ground with the usual care, and planted on a bed of mould which

had been used in the previous season in the growth of melons, and which had since been stored from the inclemency of the weather, to prevent it from being over-saturated with moisture. No care is required further than to attend to keeping up a proper succession, and to remove the roots which have ceased producing. If strong roots have been employed two cuttings will be readily obtained from them. No watering is required, the genial warmth proceeding from the adjacent chambers supplying a sufficiency of moisture.

The conditions necessary for carrying this plan into full operation are the supply of a sufficient quantity of strong roots of the articles to be forced. The roots of seakale I usually re-plant and force again in the second season. A considerable number are, however, annually destroyed; but a proper succession is kept up by raising a bed of seedlings both of kale and rhubarb on well-prepared ground every season.

I usually commence forcing early in October, and leave off when cutting in the open ground commences, the blanching of which has been effected under a covering of leaves in a semi-decayed state.

These pits are also well adapted for the protection of late vegetables, such as lettuces, cauliflowers, and endive, when taken from the ground in a state nearly fit for use. When employed for that purpose the covers are removed, and they are only partially replaced when severe frost is apprehended.

XXXVIII.—*On Clumping out Flowers.* By Robert Errington, Gardener to Sir Philip de Malpas Grey Egerton, Bart., M.P., F.H.S., Oulton Park, near Tarporley.

(Communicated August, 1848.)

It can scarcely be supposed that clumping or massing flowers has yet attained the perfection of which it is capable; for it is scarcely twenty years since the matter has been recognised as a ruling principle in the modern flower-garden. In making these remarks I do not wish it to be inferred that I suppose all good flower gardening is of necessity to be composed of the bedding-out system. However eligible and popular this mode may be as a general rule, rosaries, gardens of American shrubs, and even bulbs, herbaceous plants, or annuals, will in large establishments still occasionally be encouraged, especially in what Loudon termed the episodical manner, or as digressions from the main plan.

The most general mode of massing is to form beds of one thing only. This, I would respectfully suggest, will not be

long wholly satisfactory; it may answer as regards colour, but is very frequently unpleasing in point of figure or outline: for instance, how rich a bed of the Scarlet Geranium is in mere colour, yet in general form or figure how defective!—a lot of flat-headed low bushes, which would not be tolerated a moment but for the redeeming quality of colour. The question then naturally arises in the mind, whether elegance of outline may not be joined to richness of colouring to heighten the effect. It is a practice in some places to fill whole beds with the Eschscholtzia or Chryseis, the Clarkia, &c. &c., or lines extending the whole length of a promenade, in which our most gorgeous annuals alternate. This produces a very strong impression at first sight, inasmuch as colour is the first essential; such, however, I conceive will never afford the lasting satisfaction that a due attention to form, as well as colour, is capable of effecting. It would be well, I think, to render every individual bed in a parterre so complete in these respects, that it would bear to stand alone, and not offend the eye of taste; this would prove a strong test. The making a bed or beds subordinate to the general plan is another affair; this also must be taken fairly into the account when a scheme is devised. To give a definition of elegance of form to a bed is not a very easy task; certainly a lot of flat headed bushes will not constitute it, neither will a congregation of mere stalks. I take it for granted, that in order to pursue this principle, edgings become necessary; few will contend, I think, that the outside flowers of a bed should be as high or higher than the centre ones. Neither should the steady gradations of a mere stage be observed—at least in my opinion—for which (be it observed) I do not by any means claim infallibility; my aim is to invite attention to the subject. To accomplish neat edgings or margins to a bed, it appears to me that the pegging down system should be had recourse to whenever the plant will admit of it. Again; I think the centre of the bed should, for the most part, be the highest, unless spiral plants can be introduced right and left of the centre. To further illustrate the matter I will suppose a case or two.

For a scarlet and crimson bed, I would place a row thinly of strong growing Scarlet Geraniums down the centre, then a row of the tall Scarlet Lobelias on each side, next a row of the Tom Thumb Scarlet Geranium on each side of the Lobelias, and finally a bordering or margin of the Cuphea pegged neatly down. This bed—well grown—would be tolerably complete, I conceive, in point of both form and colour. But take away the Lobelias and the Cuphea, and you will lose the sprightliness of figure directly, especially if their places are supplied by flat-headed Geraniums. In like manner, the Salvia patens may be made to relieve the

flat-headed character of a blue mass, and the edging might be formed of the dwarf Blue Lobelias, or the Kaulfussia amelloides, whilst some of the bushy Blue Salvias might occupy the situation of the Geraniums before-named in the Lobelia bed. The Verbena family are particularly eligible for pegged down edgings, and can hardly be placed wrong; for so graceful is the character of this plant, pegged down, that it seems at all times capable of giving complete satisfaction in a bed by itself.

Whatever mixture of species may be introduced in a bed, it seems pretty certain that an identity of character, or general expression, should in some degree characterize the mixture. Thus, I would say, the Cuphea has a sort of Chinese character about it, so has the Fuchsia fulgens; therefore the Cuphea would make an edging to a bed of which the Fuchsia fulgens was the principal. The Kaulfussia amelloides is at first sight an Aster, and would make a nice edging to a blue bed, of which some of the finer Asters, as spectabilis, Amellus, or sibiricus, were principals. Identity of style of flowering, however, is not all; the style of foliage should as much as possible be taken into consideration. Simple foliage, I think, should in the main be classed with simple, and the like of compound foliage, or pinnate. These things duly carried out, it appears to me that every bed would have an individual character stamped on it, and a meaning would directly take the eye, which to persons of taste would be far more satisfactory than a total absence of design or a want of unity of purpose.

I take it for granted, also, that relief of colouring is equally necessary; a bed of Verbena Melindres is a gorgeous affair, but the eye would not love to dwell on it for any length of time, although it contributes well to the general effect at a distance; and in this respect it strongly reminds me of the noisy drums in a musical band, which are a nuisance in a close room, but are necessary at a distance, where the sound can expand. When it is desired to make a mass of a given colour—say scarlet—the more shades of that colour that could be introduced into the bed the richer the effect would be, and they would also be a relief to the eye. In such a case the scarlets might rise up to genuine crimsons, and descend almost to orange tints.

As for the herbaceous tribes in mixed beds, or in what has been termed "the changeable flower-garden," it must be confessed that under existing circumstances they are somewhat difficult to manage. To have a mixed garden complete, the flowers should be removed as they go out of blossom, and reserved stores must supply their places. This, however, would require an extensive reserve garden, as well as reserve pits or frames, and, in addition, plenty of labour.

It appears to me that the herbaceous tribes for ordinary purposes would be best in beds or borders by themselves; and it would be better not to fetter the arrangements of the massing parterre with them, unless, as before observed, every facility was afforded to repair blemishes as they occur; otherwise they are compelled to remain in their position after their blooming season has passed, and thus detract much from the richness of colouring of the parterre.

The bulbous tribes are linked closely with this subject: these mostly blossom early in the spring, however; and in settling the scheme of a flower-garden each season, everything depends on the period at which the proprietor of the estate, with his family, will be there to reside.

XXXIX.—*Notes on some varieties of Grapes, fruited in the Garden of the Society in* 1847. By Robert Thompson.

1. Sahibee.—A Deccan Grape, sent to the Society by Colonel Sykes.

A large handsome tapering bunch, sometimes slightly shouldered. Berries large, oval, white, with a rose-coloured tinge next the sun. Pulp tender, juicy, sweet, without any Muscat flavour, pleasant, but not equal in richness to the Sweetwater.

The vine, notwithstanding the hot climate from which it was imported, bursts soon into leaf; and as the fruit ripens early, it may prove eligible for very early forcing.

2. Verdal.—The foliage of this resembles that of the White Frontignan; but the fruit is more like the Royal Muscadine, to which in point of flavour it seems fully equal. It ripens early.

3. Olwer.—*Synonymes: Ollwer, Hartälber, grün Ollwer.* From Messrs. Baumann, of Bollwiller, in whose catalogue it is classed among the wine grapes, with a remark, thus: "Olwer, dont l'usage du vin doit être un préservatif contre la gravelle."

Bunch and berries rather larger than those of the Royal Muscadine. The bunch has stiff shoulders, and the pedicels are short and thick. Berries round, white. Pulp juicy, vinous, not quite so sugary as the Royal Muscadine; yet, independent of its properties as a wine grape, it appears deserving of cultivation. It ripens soon after the Royal Muscadine.

4. Reeves's Muscadine. — This was imported from the Cape of Good Hope, without a name, by John Reeves, Esq.; and as it appears deserving of cultivation, it has been designated as above.

Bunch large, broad shouldered; stalk thick; pedicels short,

stiff. Berries oval; skin yellowish white, rather thick; pulp melting, juicy and rich.

A good grape, ripening quite as early as the Black Hamburgh under similar circumstances.

5. Blussard Noir.—From Messrs. Baumann. This may be described as a smaller, earlier, and more sugary variety than the Black Hamburgh, which in other respects it resembles.

6. Gros Gromier du Cantal.—This was sent to the Society from Paris, by Mr. Francis Rauch.

A very strong-growing variety, with remarkably short-jointed wood. Leaves deeply serrated, and occasionally deeply lobed; veins and midrib on the under side somewhat rough with bristly hairs. Bunch large, with a strong stalk. Berries very large, upwards of three inches in circumference, round, of a red or grizzly colour; pulp juicy, with a flavour as if between the Black Hamburgh and White Sweetwater. The latter being by itself frequently a bad setter, and on that account not unusually fertilized by the Black Hamburgh, it is probable that this variety is a cross between the two. At all events, if this be imagined, a correct idea of the grape will be produced; for it seems to partake of both.

The following proved synonymous with sorts previously in cultivation in this country:—*Coussi Noir*, *Querci Noir*, *Frühe dunkelblaue*, *Coussitraube*. From Messrs. Baumann. This is the same as the Black Prince.

Kienzheimer Blanc Précoce, *Kienzheimer Früher Weisser*. From Messrs. Baumann. This proves to be the Early White Malvasia, which is also known by the name of Grove End Sweetwater.

XL.—*On the Culture of Lisianthus Russellianus.* By John Green, C.M.H.S., Gardener to Sir Edmund Antrobus, Bart., F.H.S.

(Communicated August, 1848.)

This beautiful and much-esteemed plant was introduced into this country in 1835, from Mexico. Being found to be capable of producing ripe seed in abundance, a large stock of plants was soon diffused among our best cultivators, who hailed it with delight. Nevertheless, strange to say, its successful cultivation, except in a few instances, still remains a desideratum—a fact amply proved by the paucity of really well-cultivated plants produced at our great metropolitan exhibitions.

Having been somewhat more successful than some of my neighbours in growing and flowering this plant, truly magnificent when

well managed, I will give my plan, which is as follows:—I sow early in spring; I first fill a six-inch pot half full of potsherds, over which I place one inch of sphagnum moss; I then fill the pot within one inch of the top with rich light sandy soil. When all is pressed down equal and firm, and a smooth surface made with the bottom of a small pot, I sow the seed, and cover it very slightly with dry white sand. I cover the pots with bell-glasses, and place them on a shelf in a shady part of an early vinery, keeping the surface constantly moist by pouring water on the outside of the glasses. As soon as the plants have come up, air is admitted, and increased as they advance in growth. When sufficiently strong they are pricked out into small pots, having the same drainage, moss, and mixture as the seed-pots, and are again shaded with hand or bell glasses until the plants become established. In three weeks or a month they require to be potted off singly into small pots; and I encourage their growth as much as possible by placing them in a shady part of either a vinery or melon-pit, whichever is kept at the highest temperature, with a humid atmosphere. As soon as they begin to fill their pots with roots, I give them once a week a little clarified manure water.

I repot into winter pots about the middle of August, using pots to suit the size of the plants, and replacing them in the same growing temperature as before, till their pots are filled with roots. After this I begin to prepare them for winter by giving them less moisture, more air, and a cooler temperature; and finally they are placed on a shelf near the glass, in the coolest part of the stove, and wintered rather dry. Early in February I begin to increase the heat and moisture; and as soon as they begin to grow freely, I repot them, which is generally about the second week in March. They receive another shift in April, and those that are intended for large specimens a third in May (using 18 or 20 inch pots), and a mixture consisting of equal quantities of good strong maiden loam, peat or bog mould, burnt clay, leaf mould, and cow manure, with a little white sand. These materials are well mixed together, and if dry are moistened to prevent their running too close in the pots. In potting I use a large quantity of drainage, and plenty of rubble stones, small potsherds, and coarse river sand amongst the mixture. I make the mixture just firm, but am very careful to leave it quite porous. I give very little water till the roots reach the sides of the pots: it is increased as the plants and the season advance, giving heat and moisture in proportion. Too much stress cannot be put upon making a proper mechanical arrangement of rich, porous, and well-drained soils, which are essential for the healthy development of plants of the nature of the Lisianthus.

When the young shoots are sufficiently advanced, I stop them immediately above the second joint; each shoot will then produce four; they require stopping about three times. The last stopping for plants required to bloom early should take place in the first week in June, and for plants required to bloom later in the first week in July. As they advance in growth the branches will require to be tied out with sticks, to make round and well-formed plants.

When the plants are growing freely, they are sometimes attacked with a disease at the base, which is produced by the moist and confined atmosphere that is required for their fine growth. To prevent this I allow the surface to become quite dry once a week, during which the plants are supplied with moisture from feeders or pans in which the pots are placed for a few hours, being careful not to allow any stagnant water to remain about them. As soon as the blooms begin to expand, I keep a drier atmosphere, and expose them to more air and light, which much improves their colour.

As to the result of the above practice, I may mention, in conclusion, that I grew some seedling plants in 1844, one of which I exhibited at the Horticultural Society's Garden in July, 1845, which was awarded a silver Knightian medal, accompanied with this note by the judges:—"Had this been exhibited in its proper place, it would have received a higher medal." In July, 1846, a second plant received a large silver medal; and to a third the same award was made in July, 1847. Another plant was also shown in the same year at the Royal Botanic Society's Garden, Regent's Park, and was awarded the first prize as a single specimen of superior cultivation. The plant that I exhibited at the Horticultural Society in July, 1847, had five hundred blooms expanded at once, ten days after the exhibition.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

27. METROSIDEROS ROBUSTA. *Allan Cunningham, in Annals of Natural History*, vol. iii. p. 112.

Received from J. C. Bidwill, Esq., in 1845, from New Zealand, as Myrtus robusta.

A handsome evergreen bush, with neat opposite oval flat emarginate leaves, and small clusters of rich crimson flowers, with long crimson stamens surrounding a cup-shaped green wavy disk. The foliage has a rich aromatic odour, but the flowers are scentless.

It is said by Mr. Cunningham, who first described it, to be the *Ratu* of the New Zealanders—"a noble tree which not unusually attains the height of 80 feet. The wood is hard, close-grained, very durable, and hence admirably adapted for ships' timbers and the construction of agricultural implements." It however flowers abundantly in the greenhouse, when not more than three feet high.

A free-growing plant, which requires the protection of the greenhouse in winter. It thrives in a mixture of sandy loam and peat in equal parts. It is increased by cuttings, and flowers freely in June.

A handsome evergreen shrub for planting in a conservatory or growing in a greenhouse. *June* 17, 1848.

28. Lupinus affinis. *Agardh.*

Raised from seeds, received from Mr. Hartweg, January 5, 1848, and said to be found growing in woods near Monterey, in California.

Stem a foot high, or less, covered with silky hairs, little branched. Leaflets 5—7, rather fleshy, linear obovate, very blunt, silky on the under side. Flowers in short irregularly whorled racemes, silky, bright deep blue, with a broad white spot in the middle of the standard. Pods narrow, tumid, hairy, containing from 5 to 7 seeds.

It requires the same kind of treatment as other hardy annual Lupines, and may be sown in any good garden soil in the open borders, where it attains a height of six inches.

A fine dwarf Lupine, and like Lupinus nanus, a very desirable one, being an abundant bloomer, and lasting a long time in flower. *June* 27, 1848.

29. Monardella undulata. *Bentham.*

Raised from seed received from Mr. Hartweg, January 5, 1848, and said to be found in fields near Monterey, in California.

Stems purple, erect, about nine inches high, little branched, covered with fine down. Leaves stalked, linear, oblong, blunt, wavy, dull grey. Flowers in stalked terminal heads, bright violet, surrounded by pale, broad, hairy, green-ribbed, roundish, involucral leaves. The whole plant emits a powerful, rather agreeable odour.

A hardy annual, growing freely in any good rich garden soil. It should be sown in the open borders, like other hardy annuals, in March, when it grows about six or eight inches in height, flowers in June and July, and remains a long time in bloom.

June 27, 1848.

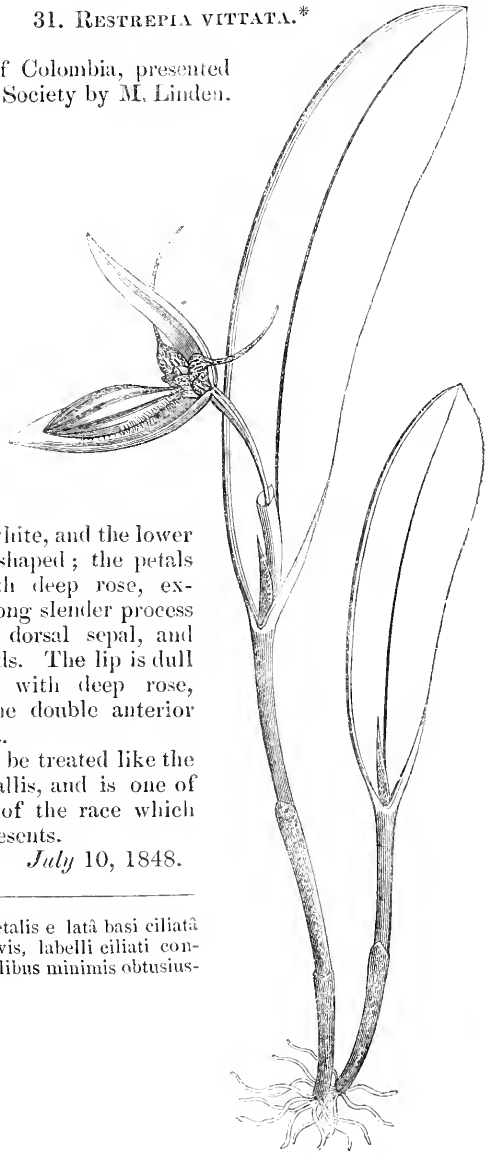
30. Amygdalus Persica: Double Crimson Peach.
From China. (See page 246 of this volume.)

This plant has presented the peculiarity of producing very generally more than one fruit to each flower, as in the annexed cut, where out of three flowers, one has two young peaches and another three. In the case of the double fruit, each half remained separate; in the other, two had grown together, and if they had ripened a double-headed cluster would have been produced. Similar cases have been seen, but it is a novelty to have a plant in which there is a natural predisposition to produce anomalous appearances of such a kind.

July 10, 1848.

31. Restrepia vittata.*

A native of Colombia, presented to the Society by M. Linden.



This curious thing has the habit of a Pleurothallis, with one long obtuse leathery leaf, which is rather shorter than the terete spotted stem. The flowers grow singly on a slender erect stalk, about half the length of the leaf. The sepals are white, and the lower somewhat boat-shaped; the petals are spotted with deep rose, extended into a long slender process as long as the dorsal sepal, and turned backwards. The lip is dull yellow, striped with deep rose, shorter than the double anterior sepal, and blunt.

It requires to be treated like the genus Pleurothallis, and is one of the handsomest of the race which that genus represents.

July 10, 1848.

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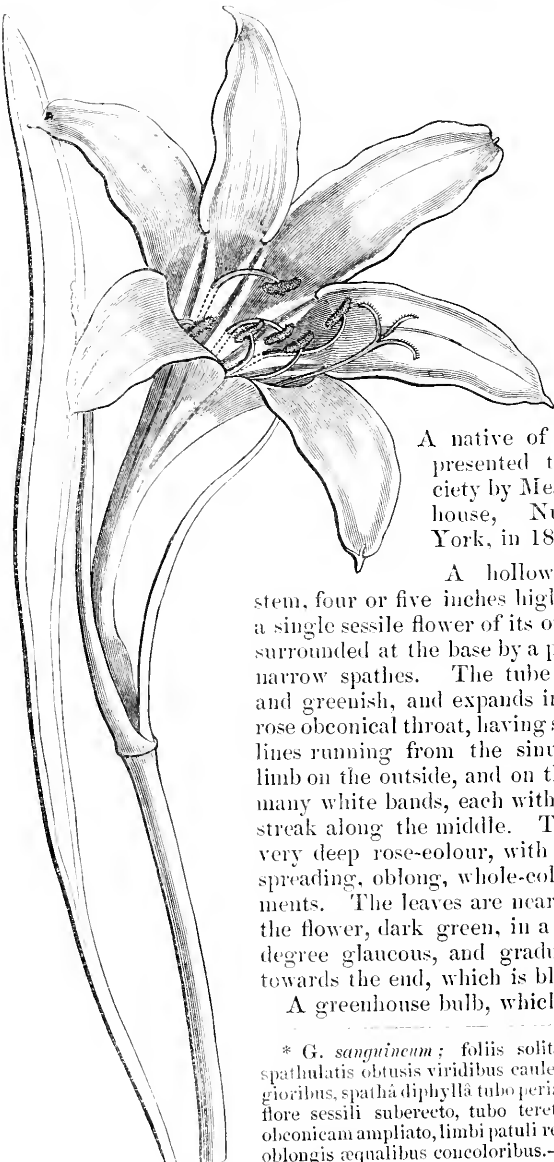
* R. *vittata;* petalis e latâ basi ciliatâ filiformibus recurvis, labelli ciliati convexi laciniis lateralibus minimis obtusiusculis.—J. L.

32. GASTRONEMA SANGUINEUM.*



A native of Caffraria; presented to the Society by Messrs. Backhouse, Nurserymen, York, in 1845.

A hollow glaucous stem, four or five inches high, supports a single sessile flower of its own length, surrounded at the base by a pair of long narrow spathes. The tube is slender and greenish, and expands into a deep-rose obconical throat, having six crimson lines running from the sinuses of the limb on the outside, and on the inside as many white bands, each with a crimson streak along the middle. The limb is very deep rose-colour, with six equal-spreading, oblong, whole-coloured segments. The leaves are nearly as tall as the flower, dark green, in a very small degree glaucous, and gradually widen towards the end, which is blunt.

A greenhouse bulb, which should be

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* G. *sanguineum;* foliis solitariis lineari-spathulatis obtusis viridibus caule unifloro longioribus, spathâ diphyllâ tubo perianthii æquali, flore sessili suberecto, tubo tereti in faucem obconicam ampliato, limbi patuli recurvi laciniis oblongis æqualibus concoloribus.—J. L.

potted in rich sandy loam, and treated like Habranthus and similar bulbs. It is increased by offsets.

It is very handsome, deserving general cultivation even in the most select collections.

August 24, 1848.

33. NAVARRETIA ATRACTYLOIDES. *Hooker and Arnott.*

Raised from seeds received from Mr. Hartweg in January, 1848, and said to be found in fields near Monterey, in California.

Stem purple, very wavy, about six inches high, covered with viscid glandular hairs. Leaves ovate, sessile, pinnatifid, with straight, stiff, spiny segments of a narrow triangular form. Flowers in nearly sessile heads, much shorter than the leaves, very pale lilac, or nearly white, with a greenish yellow tube, small, and inconspicuous. Odour of the plant foxy and unpleasant.

A hardy annual. The seeds should be sown thickly in the open borders in spring.

Only a botanical plant. It has no beauty or attraction otherwise.

July 11, 1848.

34. VALERIANA MIKANIÆ.*

Raised from the rubbish received among Mr. Skinner's Guatemala Orchids in April, 1847.

Stem entangled, terete, twining. Leaves three inches long, quite smooth, with deeply-sunk nervures, and, when bruised, the odour of peasecods. Flowers minute, white, in large entangled panicles. Corolla white, with a five-cleft revolute limb, and a gibbous tube.

A half-shrubby climbing plant, requiring to be kept in the warmest part of the greenhouse during the winter and spring months. It grows freely in any good rich loamy soil, and is easily increased either by cuttings or by seeds.

It is of no value as an ornamental plant.

August 30, 1848.

35. PHYTOLACCA ICOSANDRA. *Linnæus.*

Presented to the Society by Messrs. Veitch in 1847, under the name of Bucelia violacea.

This old but very handsome perennial has become common in gardens under the name of *Bucelia violacea.* It has fleshy,

* V. *Mikaniæ ;* scandens, glabra, caule tereti, foliis cordatis apice triangularibus acuminatis basi dentatis, nunc cordato-ovatis dentatis, floribus paniculatis minutissimis.—J. L.

erect, reddish-green stems, and succulent, oblong - lanceolate leaves, bright yellowish green, and shining on the underside, furnished with a long taper mucro. The racemes of flowers are as much as a foot and a-half long, drooping, leafless, rich rosy crimson, and hang gracefully over the sides of the plant.

A half-shrubby greenhouse plant, growing freely in any good, rich soil, and easily increased either by seeds or cuttings. It flowers during summer and autumn. If allowed to retain its natural drooping habit, it is very handsome among plants with better foliage.

August 14, 1848.

36. Achimenes candida.*

Presented to the Society by G. U. Skinner, Esq , in the spring of 1848, and said to be from Guatemala.

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* A. *candida*, caule tereti glabriusculo, foliis oppositis inæqualibus basi obliquis oblongis grosse serratis pilosis, pedunculo 3-floro petiolo æquali piloso, calycis laciniis subulatis tubo multo brevioribus, corollæ tubo obliquo decurvo basi gibboso æquali limbo obliquo laciniis subrotundo-ovatis anticâ majori, annulo dorso fisso.—J. L.

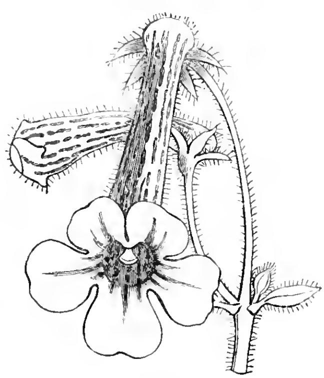
From a foot to a foot and a half high, stems purplish, nearly smooth, with a few scattered spreading hairs near the upper end; leaves about four inches long; flowers about half an inch long, with a yellowish tube, and a white flat oblique limb with a short line of purple dots along the middle of each lobe, except the frontal one, and many more within the tube. Generally three flowers appear together, of which the central ones open first and the side ones some time afterwards.

It requires the same kind of treatment as the other sorts of Achimenes. Being a neat, free-blooming plant, it is worth cultivation on account of its white blossoms, an unusual colour in the genus.

August 14, 1848.

37. ACHIMENES ATROSANGUINEA.*

Presented by Messrs. Knight and Perry, under the above name.



This is a beautiful species, with the habit of *A. Skinneri*, but with slender flowers nearly an inch and a half long, with a yellow tube spotted with dull purple, and a vivid scarlet limb as bright as that of *Mimulus cardinalis*.

It is perfectly distinct from all hitherto described, and ranks among the handsomest.

38. ROSA RUGOSA. *Thunb., Fl. Jap.*, p. 213; *Lindl., Monogr. Ros.* p. 5, t. 19. (Var. plena purpurea.)

Sent from China by Mr. Fortune: as a garden variety from Shanghae.

This plant has very much the appearance of R. Kamtchatica, but its leaves are more shining on the upper surface, and on the under they are closely covered with very pale whitish scentless glands.

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* *A. atrosanguinea*; caule pubescente, foliis pilosis oblongis subcordatis grossè serratis oppositis inæqualibus, pedunculis unifloris petiolo longioribus, corollæ tubo cylindraceo piloso basi saccato limbo parvo patulo laciniis subrotundis integris emarginatis supremis minoribus.—J. L.

The variety sent home by Mr. Fortune has semi-double sweet-scented flowers of a rich purple, about two inches across.

A hardy half-climbing kind, resembling the Rosa bracteata in habit, growing freely in any good, rich soil, and easily increased by budding or by cuttings in the usual way. It flowers from June to August. It is a distinct, but not very ornamental kind, with sweet-scented semi-double deep purple flowers.

August 14, 1848.

39. Achimenes misera.*

Presented to the Society by G. U. Skinner, Esq., in the spring of 1848, and said to be from Guatemala.

This plant, though bearing the name of an Achimenes, is a mere weed, with small dingy whitish flowers speckled with purple in the inside, of no interest whatever. It has been frequently raised in the mould of plants imported from Guatemala. The corolla has three deep depressions on its under side, with three corresponding abrupt elevations along the lower lip, and the filaments become spiral; circumstances which may hereafter lead to the formation of a new genus.

August 14, 1848.

40. Nemophila maculata.† *Bentham.*

Raised from Californian seeds sent home by Mr. Hartweg.

This is the best annual yet raised from Mr. Hartweg's seeds. With the habit of N. insignis, it has whitish flowers, distinguished by a deep violet blotch on the end of each lobe of the corolla. It varies, however, much in their colour, the dots being sometimes faint, ill defined, and run; the veins, too, of the corolla are often of a pale blue, which interferes much with the gay effect of the blossoms. It will therefore require to have its seeds saved from carefully selected plants. Mr. Hartweg called it *N. spe-*

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* A. *misera;* tomentoso-pubescens, foliis oppositis æqualibus basi haud obliquis oblongis grossè serratis, pedunculis solitariis axillaribus petioli longitudine, corollæ campanulatæ intus 3-cristatæ lobis erectis subrotundo-ovatis, tubo basi æquali, calycis laciniis lanceolatis corollæ subæqualibus, filamentis spiralibus, annulo completo.—J. L.

† *N. maculata;* patentim pilosa, foliis radicalibus pinnatifidis lyratis laciniis brevibus obtusis subfalcatis 2-3-lobis integrisque supremis cuneatis trilobis, pedunculis 1-floris foliis longioribus, calycis sinubus reflexis, corolla calyce multò longiore appendicibus crenulatis convolutis, ovulis plurimis.—J. L.

ciosa, a very objectionable name, for which Mr. Bentham has substituted *maculata.*

It requires exactly the same treatment as N. insignis.

Sept. 5, 1848.

END OF VOL. III.

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PROCEEDINGS AT MEETINGS OF THE SOCIETY.

September 7, 1847. (Regent Street.)

Elections. Mrs. Newdigate, Woodlands, Blackheath; Mrs. Young de Lautour, 73, Portland Place, and Hexton House, near Hitchin; Benjamin Attwood, Esq., Bridge Street, Blackfriars; Thomas John Bell, Esq., Audley Cottage, Fulham; Thomas Boddington, Esq., St. Helen's Place and Gunnersbury Lodge, Acton; George Stanton, Esq., Pen-y-Nant, Ruabon, Denbighshire; and Richard Shuttleworth Streatfield, Esq., The Rocks, Uckfield.

Awards. *Large Silver Medal:* To Mr. Barnes, gardener to the Right Hon. Lady Rolle, F.H.S., Bicton, Devonshire, for two Pine Apples, a Montserrat and an Antigua Queen, the former weighing 5 lbs., the latter 5 lbs. 5 ozs., being part of a number of fruit which had been ripened in the open air in the kitchen garden at Bicton. The Montserrat measured 10 inches in height and 16 inches in circumference, and the Antigua Queen 9 inches in height and 17 inches in circumference, both perfectly ripe and nicely-swelled fruit, but the former a little deformed. The following table exhibits the weights and dimensions of a few of the fruit which Mr. Barnes has succeeded in ripening in the open air this summer at Bicton:—

Date.	Variety.	Circumference.	Height.	Weight.	
		Inches.	Inches.	Lbs.	Ozs.
July 5	Queen	..	..	4	3
15	Do.	..	..	4	4
	Do.	..	..	4	5
27	Three Queens . . .	..	..	12	9½
Aug. 1	Queen	..	..	5	2
12	Do.	17	10	5	8
	Enville	19	10	5	6
15	Queen	16½	9	5	4½
	Do.	17	9	5	9
19	Montserrat	15	10	4	8
	Brown Sugar Loaf .	16	10½	5	2
	Montserrat	15½	10	4	9
	Queen	16	9	4	8
	Russian Globe . . .	17	9	4	9

This experiment, which fully demonstrates the possibility of ripening the Pine Apple in the open air during our summer, was conducted in the following manner. In May last, Mr. Barnes having some plants ready, although the weather was unfavourable, opened a trench, casting the earth right and left, so as to form a bank on each side, which he imagined would afford some shelter from cold winds; in the bottom of the trench he placed bricks in threes, in the form of a triangle, so as to make a dry bottom for the plants to stand on, and at the same time to secure a ready passage for air and water. The plants having been placed on the bricks, were packed to the rims of the pots in tree-leaves, which had been used during the winter in and about hot-beds. This being done, the whole surface, banks and all, was covered with charred hay or grass, which Mr. Barnes considered the best material for absorbing heat, retaining it, and giving it off gradually; in which expectation he was not deceived; for, although the weather proved cold at intervals, stormy and windy, frosty mornings, and many dark sunless days, little or no injury was sustained, and when the sun did appear the fruit made great progress; at the same time the suckers which sprung up grew vigorously, and were most healthy. The plants employed had never been subjected to fire-heat at any time. They were turned out after they had blossomed.

"The fruits exhibited," says Mr. Barnes, "I do not regard as anything extraordinary; but they are tolerably good fruit, considering the conditions under which they were grown, having been exposed in the open air since early in May last, as above described,—a plan on which I hope in future, should I be spared, to make considerable improvement. A few of the fruit, like one of the specimens sent, were a little deficient at their summits, owing to their not having quite finished blossoming before they were turned out. The weather, as has been already mentioned, having taken an unfavourable turn, being very stormy, with drenching cold rains, and some sharp morning frosts, entirely destroyed the little bottom-heat which I had provided, and, in my opinion, caused the little defect just alluded to. The points of some of the leaves, too, after the sun set in hot, became browned, particularly the Jamaicas, but they recovered their colour as the weather became kind; and their suckers, which have been grown entirely in the open air, have continued as green as leeks, and as thick and fleshy as aloes.

"I have long advocated," continues Mr. Barnes, "an

extensive reform in the general system of applying bottom-heat; and does this experiment not prove the absurdity of applying it in excess? The roots of the old shoots, when turned out of their pots after the fruit had been cut, were in the most healthy condition, though they had little heat beyond what Nature herself provided; indeed, I may say none whatever, save what the charred hay absorbed. It has been remarked by some, and possibly imagined by many others, that Pine-apples could not be ripened in the open air in any other county but Devon. As a proof, however, that we are not favoured with so much sun as some other counties, I may mention that crops are generally earlier in other parts than here. I could always gather peas from six to ten days earlier in Surrey, Kent, Middlesex, and Essex than I have been able to do here, and other vegetables in proportion; and, as to forcing early fruits, Devon possesses the worst climate with which I ever had to contend. In this locality we have a continuance of dark, humid, cold, hazy, cloudy, drizzling, rainy, and sea-foggy weather in spring and early summer, with less sun at all seasons than in other parts in which I have gardened. For weeks together in some seasons we have fogs or mizzling rains at almost every return of the tide; and what I have accomplished in regard to Pine-culture in the open garden here, I consider might be accomplished in any other part of the kingdom, taking care to have well-drained pots, and the soil porous and open. In regard to economy of ground, the space taken up by the plants having been a cause of complaint with some, I may remark, that by the sloping bank and valley system which I practise I obtain a considerable increase of surface. I am now cutting the second crop of cabbages which have been grown on the outside of the sloping banks between which the Pines have been cultivated. The cabbages were planted some time after the Pines were put out. Indeed, I see no reason why we should not cultivate the Pine-apple in this way on an extensive scale, provided method and principle were brought to bear on the subject. The suckers, some of which are sent for inspection, have sprung up and made their entire growth in the open air, and I have others fully three times their size. Some we have potted are now in 12-inch pots, and good plants, such as will no doubt produce good fruit next season; indeed, I never saw suckers grow more kindly and rapidly in a pit or stove.

"The following is a register of the out-door temperature, taken three times a-day for 82 of the days during which the

Pines were swelling their fruit, the thermometer being placed a foot above the surface of the charred hay, in the centre of the valley or trench :—

Periods of the Day.	June 15th.	June 23rd.	July 1st.	July 9th.	July 17th.	July 25th.	Aug. 1st.	Aug. 9th.	Aug. 17th.	Aug. 25th.	Sept. 1st.
6 A.M.	54°	56°	60°	58°	64°	56°	58°	52°	56°	44°	50°
12 Noon.	66	70	86	74	87	70	94	78	78	78	74
6 P.M.	58	66	74	60	68	58	70	58	60	59	58
	16th.	24th.	2nd.	10th.	18th.	26th.	2nd.	10th.	18th.	26th.	2nd.
6 A.M.	50	56	68	56	57	58	48	54	54	50	52
12 Noon.	60	70	84	70	64	84	80	60	76	80	72
6 P.M.	54	62	66	64	57	64	64	57	64	60	56
	17th.	25th.	3rd.	11th.	19th.	27th.	3rd.	11th.	19th.	27th.	3rd.
6 A.M.	36	57	53	64	55	58	58	55	60	52	50
12 Noon.	72	74	78	82	62	86	90	64	80	78	70
6 P.M.	39	62	68	72	60	64	68	56	66	62	60
	18th.	26th.	4th.	12th.	20th.	28th.	4th.	12th.	20th.	28th.	4th.
6 A.M.	52	58	53	62	60	54	48	56	60	60	52
12 Noon.	73	82	70	84	80	82	76	66	83	78	74
6 P.M.	58	69	60	70	72	61	54	58	62	64	53
	19th.	27th.	5th.	13th.	21st.	29th.	5th.	13th.	21st.	29th.	
6 A.M.	52	56	58	64	60	58	52	58	58	50	
12 Noon.	76	80	80	92	81	90	70	90	82	79	
6 P.M.	62	65	67	70	60	72	54	60	64	60	
	20th.	28th.	6th.	14th.	22nd.	30th.	6th.	14th.	22nd.	30th.	
6 A.M.	56	58	52	66	58	60	54	56	56	50	
12 Noon.	71	84	70	94	84	92	84	84	78	72	
6 P.M.	60	78	64	73	62	70	64	64	58	62	
	21st.	29th.	7th.	15th.	23rd.	31st.	7th.	15th.	23rd.	31st.	
6 A.M.	58	68	53	65	59	62	58	57	48	52	
12 Noon.	59	88	74	96	80	88	76	86	80	78	
6 P.M.	60	80	62	70	60	68	60	65	62	60	
	22nd.	30th.	8th.	16th.	24th.		8th.	16th.	24th.		
6 A.M.	58	60	68	70	58		58	60	50		
12 Noon.	68	86	76	92	78		80	74	76		
6 P.M.	58	80	63	70	62		62	63	58		

"This register is, however, hardly a criterion by which to judge of the heat of the atmosphere generally; for the thermometers were sheltered from cold draughts by the banks."

The Pines exhibited were not tasted ; but it is the opinion of all who have eaten the fruit of this experiment that it is unrivalled in flavour ; a point of the greatest importance,

proving as it does that Pines, to be best flavoured, should have a thoroughly well-aired house while ripening their fruit.

Knightian Medal to Messrs. Loddiges, of Hackney, for various Orchids, more especially Oncidium spilopterum, a handsome and scarce species; an Oncidium from New Granada, Peristeria elata with four strong flower spikes, and Stenorhynchus cinnabarinus. To C. B. Warner, Esq., F.H.S., for Zygopetalum maxillare, Dendrobium formosum, and Cattleya violacea, the latter bearing thirty-six open flowers.

Banksian Medal to Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for Phalænopsis amabilis, and a nice plant of Dendrobium formosum. To Mr. Mason, gardener to Sir John Kennaway, Bart., Escot, Devon, for a Queen Pine Apple, handsomely formed and well swelled, weighing 6 lbs. 5 ozs.

Certificate of Merit: To G. H. Ward, Esq., F.H.S., Northwood Park, Cowes, for a dish of Muscat Escholata Grapes, a variety raised by Mr. Money many years ago, but till now lost sight of. It was then considered to be hardy, and very suitable for out-door culture. Those exhibited, however, had been grown under glass. The particular characteristics of the variety are its size, and the length of time it hangs without shanking or shrivelling. Mr. Ward stated that he had had berries in December, which measured more than four inches in circumference. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., Withington Hall, Chelford, for Melons, more especially a striped Hoosainee, weighing 6 lbs. 4 ozs., a variety much grown and esteemed by the late Mr. Knight, but which it is now difficult to find genuine. This was, however, the true variety raised from seeds fifteen years old, which had been received from Mr. Knight. The other sorts exhibited were two Ispahans, weighing 10 lbs. 11 ozs. and 4 lbs. 14 ozs., and a Cabul, 6½ lbs. The Ispahan and Hoosainee were grown in a pit, heated by tanks under the bed; and it was stated that this was the third crop of Melons from the same pit, besides its having produced above a hundred large early cucumbers, which were cut away (with the exception of one plant, which continues still to produce fine fruit) as the Melons advanced. The first and second crops of Melons were sent up to London in June and July, consisting of Beechwood, Ispahan, and China, the two latter kinds being of very fine flavour. To Messrs. Backhouse, of York, for Achimenes venusta, a charming rosy purple-flowered species, apparently the result of a cross between patens and rosea; the

rich colour of the former being infused into the small flowers of the latter. Also to the same nurseryman, for a cut specimen of an orange-coloured plant from Caffraria, resembling a Geissorhiza—apparently a very handsome thing, and supposed to be hardy. To Messrs. Veitch and Son, of Exeter, for Calceolaria albiflora, a neat-looking species, a plant of which, now in bloom in the open ground at Exeter, was stated to have survived last winter in an open situation without any shelter.

MISCELLANEOUS SUBJECTS OF EXHIBITION. Justicia coccinea, a seldom seen species, from Mr. Glendinning, of Turnham Green; two plants of Lilium lancifolium rubrum, or speciosum, from Mr. Groom, of Clapham Rise, each a single stem, bearing upwards of forty flower buds. "My object in exhibiting them," wrote Mr. Groom, "is to show how well this variety of Lily grows in the open ground; and as they are perhaps the finest specimens of single stems ever produced, a short account of their culture may possibly not be uninteresting:—

"A bed 4 feet wide, of common garden soil, was prepared about the end of November, 1845, by being dug and well broken with a fork, but without any manure, which I do not consider desirable in the cultivation of the Lily. After the bed was raked level, the bulbs were planted on the surface 15 inches asunder each way, spreading the fibres regularly out. They were then covered $3\frac{1}{2}$ inches deep from the top of the bulbs with a light sandy soil, composed of sand and fine mould in equal proportions; the bed was then raked level and left without further care, and it was *not* protected from frost or bad weather in any way; last autumn, after the stems were quite dead, the top soil was removed down to the bulbs, but without disturbing them, and fresh sandy soil was laid over them to the same depth as before. In this bed they flowered well last year, but were sadly injured by the hailstorm of the 1st of August—so much so, that I feared I should have but a very indifferent display of them this season; they have, however, recovered their strength, and are now in luxuriant growth. It is from this bed I have taken the two specimens now forwarded, which were taken up and potted in the end of last week.

"I have now established the fact of this variety being equally hardy with the other sorts, and from the vigorous growth and fine colour of the foliage, it is clear it succeeds better in the open ground than when kept in a close greenhouse, fully illustrating the advantages to be derived from a free circulation of air in our glass-houses.

"I have grown the other kinds of Japan Lilies in the open air with much success for some years, and have now many thousand flowers just bursting into beauty.

"I cannot help calling attention to this plant for ornamenting gardens and pleasure grounds, flowering as it does without any trouble, in the open borders at this period of the year, when good flowers are so much needed. It is also a most desirable plant in pots for decorating the conservatory, being very fragrant as well as beautiful."

Mr. Josling, of St. Alban's, sent a dish of his St. Alban's Grape, some account of which will be found at p. 296, Vol. i. The bunches exhibited were green and unripe; when ripe the berries have a yellow tinge, and are fleshy, with a fine Frontignan flavour. Pretty good bunches of Cannon Hall Muscat, Black Hamburgh, and White Nice Grapes, were contributed by Mr. Ayres, gardener to J. Cook, Esq., F.H.S., Brooklands, Blackheath, with the following memorandum concerning their cultivation:—

"The Grapes exhibited are not sent as being anything remarkable, but merely as samples of the second crop from vines which have only been planted two years and six weeks, and have therefore not been grown so long as the vines in the glass-covered and hot-water heated border, from which Grapes were exhibited at the last meeting of the Society. My border is made wholly above the surface of the surrounding soil, and is formed in the following manner:—A layer of concrete 3 inches thick was placed on a previously prepared sloping border, and rammed quite firm, introducing a line of 2-inch drain pipes opposite the end of each rafter; over this was then laid from 1 foot to 18 inches of brick rubbish, intermixed with oyster-shells and rough bone-dust, and the same materials were liberally thrown in with the soil, a good top-spit turfy loam, to which a little half-decomposed leaf mould was added. The border at the present time is little more than 6 feet wide and about 18 inches deep; but this autumn I intend to add 4 feet more to it, and when finished, which will not be for several years to come, it will be about 20 feet wide. In making the border, my object was more to ensure its being thoroughly porous than to make it rich, as I consider it much wiser to trust to top-dressing and liquid manure for stimulants than to make a rich border, which after a few years becomes sour and unhealthy. My borders are so thoroughly porous, that ten gallons of water poured on will run through and out at the drains. The vines were planted on the 26th of July, 1845, and after that time ran to the

top of the house and ripened their wood; but in 1846 they produced some nice Grapes, and this year they have produced a very pretty crop, from which I have been cutting since the beginning of June. It will therefore be seen, that however good Grapes grown by the means of glass-covered and heated borders may be, equally good can be produced in less time without such aids."

From Mr. Henderson, gardener to Sir George Beaumont, Bart., was a sweet Melon of Ispahan, weighing 13 lbs. 2 ozs.; and from Mr. Stanton, gardener to H. Stainton, Esq., of Lewisham, was a Cantaloup Melon, weighing 6 lbs. 3 ozs., and a dish of Noblesse Peaches.

NOVELTIES FROM THE SOCIETY'S GARDEN. Aërides quinquevulnera, a fine specimen; Achimenes Skinneri, a species just now flowering, and of great merit, of which, however, there are some indifferent varieties; a new Gilia, named pharnaceoides, a little flax-like annual, one of Mr. Hartweg's latest importations; and Anemone Japonica, a most useful plant, and as handsome as a Chrysanthemum. Seeds of Genista Ætnensis, a hardy shrub from the woody parts of Mount Ætna, were distributed to Fellows.

BOOKS PRESENTED.

Flora Batava, No. 147. From His Majesty the King of Holland.
Transactions of the Royal Society of Edinburgh, Vol. 17, Part 2; and Proceedings of the Society, Nos. 29 and 30. From the Society.
Quarterly Journal of the Geological Society, No. 11. From the Society.
Réglement de la Société d'Horticulture de Louvain sous la devise Dorothée et exposition d'été, June, 1847. From the Society.
Transactions of the Agricultural Society of Vienna, Part 1, Vol. 4, N. S.; and Neiderösterreichisches Landwirthschaftliches Wochen-Blatt, 1846. From the Society.
Paxton's Magazine of Botany, from February to July inclusive. From the Editor.
The Athenæum for the month of August. From the Editor.
The Botanical Register for September. From the Publishers.
The Critic, No. 139 of Vol. 6. From the Publishers.

October 5, 1847. (REGENT STREET.)

ELECTION. The Hon. Mrs. M'Adam Cathcart, Ayr.

AWARDS. *Knightian Medals:* To Messrs. Loddiges, of Hackney, for a collection of Orchids, comprising, among others, Cattleya bicolor, a scarce species with deep violet lip and tawny green petals, C. granulosa, Angræcum pertusum, Odontoglossum grande, the latter particularly well coloured; and, by way of contrast, two specimens of Cymbidium giganteum, one flowered in a hothouse, the other in a cool well-aired greenhouse. The latter was richly coloured, while the former was comparatively colourless, a fact which conclusively proves the benefits to be derived from cool and airy treatment, more especially when the plants are coming into flower. From the same were plants, growing on the

surface of boards, of Platycerium grande, a noble Fern, and one of the easiest to cultivate, and a small plant of Anopterus glandulosus, a new greenhouse plant from New Holland. To Mr. Catleugh, of Hans Place, Chelsea, for magnificent plants of Aphelandra cristata, and the larger variety of Justicia carnea. The Aphelandra was a yard high, and about the same through, bushy, and bearing 12 large heads of cockscomb flowers. The Justicia was about 3 feet in height and 4 feet through, bushy to the pot, and ornamented with 156 heads of bloom, the third crop of flowers in 12 months. The plant was only 18 months old. It was shifted out of a 3-inch pot into a 6-inch pot in August, 1846. In this it was kept over the winter till March, 1847, when it was finally shifted into a 15-inch pot, in which it was flowered. It produced 10 heads of blossom in May last, 92 in July, and finally it was exhibited now (Oct. 5) in the condition described. After each respective flowering the shoots were stopped; the plant was grown near the glass in a stove whose temperature averaged 65°; it received little care beyond ordinary management. The soil in which it was grown consisted of equal parts turfy loam and peat, to which was added a little sand and bone-dust.

Banksian Medals: To Messrs. Veitch and Son, of Exeter, for a new Vanda, a Java species, sent by Mr. Thomas Lobb under the false name of insignis; it approached V. Roxburghii in appearance, but is distinct from that as well as from the other species at present in cultivation. To Mr. Woodham Death, Netteswell, Harlow, for a specimen in bloom of the Chinese Renanthera coccinea, which is blooming a third time within 23 months. "I am aware the plant is by no means a remarkable specimen, but I am induced to exhibit it from having heard that many cultivators of Orchids find the Renanthera a difficult plant to flower. The treatment I adopt is to keep it in a cool house fully exposed to the sun." To Mr. Glendinning, of the Chiswick nursery, for a new Dipladenia, called nobilis, a pretty species, with tuberous roots, ovate, nearly sessile leaves, and bunches of large delicate pink flowers, which assume a deeper hue in the throat. To Mr. Craggs, gardener to Sir T. D. Ackland, Bart., M.P., Killerton, Devonshire, for a fine Miltonia Clowesii, which was, however, unfortunately past its best. To Mr. Mason, gardener to Sir John Kennaway, Bart., of Escott, Devonshire, for 8 Queen Pine Apples, all excellently formed fruit, and well ripened, weighing respectively 5 lbs. 13 oz., 5 lbs. 10 oz., 5 lbs. 3 oz., 5 lbs. 8 oz., 5 lbs. 1 oz., 4 lbs. 12 oz., 4 lbs. 11 oz., and 4 lbs. 7 oz. Than these whose weights

speak for themselves, it is scarcely possible to imagine better grown fruit.

Certificate of Merit: To Mr. Catleugh, of Hans Place, Chelsea, for a new Heliotropium called Voltaireanum, a deep purple variety, so named because raised at Voltaire's residence at Ferney. It is handsomer than the common Heliotrope. To Messrs. Veitch and Son, of Exeter, for a plant sent from Peru by Mr. W. Lobb as a Nolana, but which appeared to be a Petunia, or a plant nearly allied to Petunia, with large, coarse, deeply-lobed leaves and delicate pink flowers with a violet eye. To E. Lawford, Esq., of Eden Park, Beckenham, for three baskets of Potatoes having the decayed stems attached, each basket being the produce of one grain of seed sown last spring. Two baskets were the produce of two seeds obtained from Baden; the other was from Mussooree, in the East Indies. The tubers raised from the latter were the smallest, the whole produce of the one seed weighing 2 lbs. 1 oz.; while the produce of the two Baden seeds weighed respectively 4 lbs. 9 oz. and 3 lbs. 4 oz. of fine large potatoes, quite as large as could be expected from sets planted in the ordinary routine of field culture! For the means taken to obtain so remarkable a result, see the Proceedings of Nov. 2 (p. xix.).

MISCELLANEOUS SUBJECTS OF EXHIBITION. Plants of Achimenes from Mexico, and a little lilac-flowered Primula from Nepal, from Messrs. Jackson, of Kingston; a collection of 36 varieties of Pansies and two seedling fancy Dahlias from Mr. Turner, of Chalvey; and boxes of autumnal Roses from Messrs. Paul and Son, of Cheshunt, of which the following were a few of the best, viz. *Perpetual:* La Reine, Baronne Prevost, Prince de Galles, Duchess of Sutherland, and Duc d'Aumale. *Noisette:* Ophirie. *Tea:* Safranot, Comte de Paris, Adam, Mirabile, Pactolus, Goubault, and Niphetos. *Bourbon:* Souchet, Dupetit Thouras, George Cuvier, Souvenir de la Malmaison, and Marianne. Of fruit, Mr. Hume, of Bretton Hall, Wakefield, York, sent a Providence Pine Apple weighing 7 lbs. 11 oz.; Mr. Standen, gardener to Mrs. Keates, Kennington, small and indifferently coloured Black Hamburgh Grapes, from the open wall; Mr. Elliott, gardener to R. W. Gaussen, Esq., F.H.S., fair samples of Wilmot's Black Hamburgh (?), ripened without the aid of fire heat; and good-looking bunches of Black Hamburgh, grown under similar circumstances, were communicated by Mr. Holmes, gardener to the Marquess of Winchester. Fair specimens of Peaches, examples of what could be produced on open walls in Derbyshire, were exhibited by Mr. Muir-

head, of Sutton Hall, Chesterfield; and of Plums, Messrs. Henderson, of Pine-Apple Place, sent a seedling much resembling well-ripened specimens of Coe's Golden Drop, but found to be inferior to that variety in quality. The variety was stated to have been raised some years ago by a gardener at Stanmore, and to be a good bearer as a standard. A fruit of the Courge Marron, or Chesnut Gourd, a small round variety esteemed in France, was exhidited by Mr. Deane, of Clapham. It was stated that when eaten in its green state, this Gourd was excellent—by some even preferred to Vegetable Marrow—and that when ripe it was equally valuable as an article of food. Of Potatoes, large and fine-looking tubers of Burgess's Early Prolific, Goldfinder, and Early Shaw, were shown by Mr. Robinson, gardener to J. Simpson, Esq., of Pimlico. These were perfectly free from disease, as were also English-grown specimens of Bermuda potatoes, exhibited by E. Brande, Esq., of Turnham Green. The latter were the produce of sets obtained from Bermuda, and distributed by the Society in spring, together with seeds of White Silesian Beet, a useful kind, two plants of which were also exhibited by Mr. Brande.

Specimens of "Protecting Material," consisting of two layers, the upper a waterproofed canvas, the under some undressed fabric, came from Mr. Yexley, of Merton, Surrey.

NOVELTIES FROM THE SOCIETY'S GARDEN. Acacia linifolia, a graceful New Holland species, which promises to be useful on account of its flowering in autumn; Mr. Fortune's Anemone Japonica and Abelia rupestris; Mulgedium macrorhizon, a useful rock plant, but difficult to winter on account of its liability to damp off; and finally, cut flowers of Tacsonia mollissima and Cestrum aurantiacum, the latter an invaluable autumn-flowering conservatory shrub, which, to be seen in perfection, should be planted out in the bed where it has plenty of room.

BOOKS PRESENTED.

Journal of the Royal Asiatic Society, Vol. 10, Part 3. From the Society.
Proceedings of the Zoological Society, Nos. 167 to 176 inclusive; List of the Fellows, June 1847; and Reports of the Council and Auditors, April 29, 1847. From the Society.
The Botanical Register for October. From the Publishers.
Comptes rendus hebdomadaires des Séances de l'Académie des Sciences à Paris—1er semestre, 1847. From the Academy.

November 2, 1847. (REGENT STREET.)

ELECTIONS. Francis Joseph Sloane, Esq., Palazzo Boutourline, Florence, Fellow; and Mr. José Salvador, of Barcelona, Foreign Corresponding Member.

AWARDS. *Knightian Medals*: To Messrs. Loddiges, of Hackney, for various Orchids, more especially Oncidium crispum, a large-flowered variety of Barkeria Skinneri, Cattleya Loddigesii, Epidendrum vitellinum, a white-lipped variety of Odontoglossum grande, and the rare Apricot-coloured Calanthe curculigoides. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for a collection of Orchids, consisting of Lælia Perrinii, Lycaste Skinneri, a very large-flowered Phalænopsis like amabilis, Epidendrum Skinneri, the beautiful Oncidium Barkeri, and other Oncids. To Mr. Moore, gardener to R. Hanbury, Esq., F.H.S., for Odontoglossum grande, Trichopilia tortilis, Cattleya labiata superba, and other Orchids. To Jones Nash, Esq., of Bishop's Stortford, for very fine bunches of Black Hamburgh and perfectly-ripened Muscat of Alexandria Grapes.

The vineries in which these were produced, it is understood, are heated with brick flues. The rafters are nearly 20 feet long, with upright sashes in front. There is a pit in the middle of each, filled with tan which is renewed annually. The glass is chiefly crown; but the lower sashes of one house are glazed with 16-ounce sheet. Ventilation is managed by opening the sashes in front, and sliding down those at the top.

The Black Hamburgh Vines were planted in 1843, and cut back in 1844, when each at once made the whole of the single rod that furnishes the crop. These rods are now, on an average, 5½ inches in circumference, and run straight up the centre of each light, so that the leaves and bunches are exposed to all the light and air which the houses can furnish. The borders are thus constructed. The houses are built on the side of a low hill, with a gravelly bottom. On the *surface* of the natural ground, which was coated with concrete, the border has been formed 3½ feet deep at the back, and 2½ feet deep in front, so that it slopes from back to front, where it is rounded off. No rain can ever lodge there. It was formed with burnt clay (the bottom of some old brick-kilns), loamy turf from an old pasture, plasterers' rubbish, hair and trimmings of hides (called fleshings) from the tan-yards, and an enormous quantity of thoroughly-rotten stable manure—the last border alone consumed a barge-load of 40 tons of such manure. All these materials, after being thrown together, were *thoroughly incorporated*. They form so loose a bed that a stick may be easily pushed through it to the very bottom.

Every November these borders receive a good mulching of stable manure, which remains to rot in the succeeding

summer; so that the surface is always covered by a rich decaying material which absorbs heat from the sun, and detains the natural dampness of the border.

The Vines are managed upon Mr. Crawshay's plan.

Banksian Medals: To Mr. James Donald, gardener to Mrs. Lawrence, of Ealing Park, F.H.S., for good plants of Cattleya labiata, Angræcum bilobum, and a tall cylindrically-trained Dipladenia crassinoda, bearing seven unusually highly-coloured blossoms. To Messrs. Veitch and Son, of Exeter, for Clerodendron macrophyllum, a noble-looking plant with large handsome leaves and a great panicle loaded with white flowers from the pot to its top; also cut specimens, placed in pots, of Æschynanthus miniatus, a species in the way of, but distinct from, and better coloured than radicans; Salvia oppositiflora, a scarlet-flowered species; and a Fuchsia, in the way of Corymbiflora, named Dependens.

Certificates of Merit: To Mr. Catleugh, of Chelsea, for a very fine plant of Mr. Fortune's Torenia concolor, 4 feet high, and 3 feet through, exceedingly well grown, but hardly sufficiently advanced in bloom. To Mr. Low, of the Clapton Nursery, F.H.S., for an Eria (Fig. A), producing from the old stems little nodding spikes, between 3 and 4 inches long, densely crowded with cream-coloured flowers. "I have sent," wrote Mr. Low, "one of my Borneo plants. My son says he found it on the banks of the Sarawak river, growing in large masses on trees, the branches of which were fully exposed to the sun. The flower-spikes are not unfrequently from 8 to 10 inches in length, each stem having several, and giving to a large mass in flower a very neat and beautiful appearance." In the absence of leaves, there was no means of determining how far it might be distinct from E. floribunda; its flower-spikes were much more dense, and the flowers were wholly destitute of the pink tinge so conspicuous in that species. It may be called provisionally E. leucostachya. Fig. 1 in the accompanying cut represents the form of its column and lip.—To Mr. Craggs, gardener to Sir Thomas Acland, Bart., M.P., Killerton, Devon, for Lælia Perrinii, a good plant, but somewhat shaken by travelling.

MISCELLANEOUS SUBJECTS OF EXHIBITION. Cut specimens of Cycnoches Loddigesii, Oncidium Pinellianum* (Fig. B) and

* This is a very beautiful Brazilian species, of which no account appears to have yet been given publicly. The name, which is of foreign origin, occurs in Messrs. Loddiges' catalogue, where it is said to have been introduced in 1841, but I do not find it elsewhere. The flowers are a very bright yellow, with dark-brown blotches and spots on the sepals, petals, and base of

Fig. A.

some Catasetum, apparently Russellianum, from Mr. Pass, gardener to Thomas Brocklehurst, Esq., F.H.S., the Fence, Macclesfield; and a small Oncidium, apparently variegatum,

the lip: in the amount of blotching there is, however, some variation in different individuals. They appear closely packed in a secund manner upon the short branches of a small panicle, as is shown in the cut, where 1 represents the column and wings magnified, and 2, a magnified flower from which the columns and upper half of the lip have been removed. The species is very near *O. spilopterum* (also called *O. galloparinum*), from which it differs in having a branched panicle, sepals and petals larger in proportion to the lip, and a crest more broken up at the base into short parallel plates. I am not sufficiently acquainted with the plant to speak of it further.—J. L.

Fig. B.

a Cuba species, from Mr. Beck, of Isleworth, F.H.S. Of Pine Apples, Mr. Mason, gardener to Sir John Kennaway, Bart., of Escott, Devon, sent seven Queens, weighing respectively 5 lbs. 1 oz., 4 lbs. 14 oz., 4 lbs. 14 oz., 4 lbs. 10 oz., 4 lbs. 8 oz., 4 lbs. 4 oz., and 4 lbs. 2 oz. These were all hand-

somely formed fruit, and were stated to have been cut from plants whose age varied from twenty to twenty-two months. Various Grapes were exhibited. Bunches of Black Hamburgh and White Chasselas, ripened on the open wall, were shown by J. B. Daubuz, Esq., of Worthing, F.H.S.; and from R. Warner, Esq., were bunches of some small black Grape which had been ripened under a glass case without fire heat, in the city, in a nearly north-west aspect, where from interposing objects they had only about an hour's sun about four o'clock in the afternoon. They were quite black, —a fact corroborative of the opinion now generally entertained that to have well-coloured grapes it is not necessary that the bunches should be exposed to the direct rays of the sun. Finally, Black Hamburgh Grapes, fair bunches but ill coloured, produced on the open wall in Devonshire, were exhibited by Mr. Craggs, gardener to Sir T. Acland, Bart., M.P. The vine on which they were grown was stated to cover a piece of wall 38 feet long and 8 high, and to have now on it upwards of 400 bunches of fruit. Lateral branches bearing fruit of the "large-fruited Monthly Raspberry," were shown by Mr. Rivers, of Sawbridgeworth, F.H.S. Concerning this variety Mr. Rivers says—"I think it one of the most valuable introductions we have lately been favoured with in that class of fruits. It is, I believe, of continental origin, and may be called the 'Large Fruited Monthly Raspberry;' it continues to bear from the end of August, all through September, October, and if the frost is not very severe (it does not mind a slight frost) till the end of November. The late heavy rains have injured its flavour slightly; before they visited us it was quite equal in flavour, as it is in size, to Raspberries in July. To ensure a very abundant crop in autumn, all the canes should be cut down in spring close to the ground; but a good autumnal crop may be obtained, as well as a crop in summer, by leaving only one cane, cut in the usual manner, to each root, cutting the others down closely for the autumnal crop. My plants are now covered with fruit in all its stages, and many lateral shoots are just coming into bloom, so that if grown in large pots and placed under glass, raspberries may be gathered in December. It bears its autumnal crop from lateral shoots, which each row puts forth from every joint, forming a beautiful pyramidal bush. In this respect, as well as in the superior size and flavour of its fruit, it differs from the old variety known as the Double-bearing Raspberry. At this moment my plants are borne down with the weight of fruit upon them."

From Mrs. Whatman, F.H.S., Vinters, Maidstone, came two specimens of a large fine-looking seedling Apple. Specimens of four kinds of Potatoes, the produce of single seeds, were again exhibited by E. Lawford, Esq., of Eden Park, Beckenham. They had been raised respectively from seeds sent from Mussooree (on the Himalayan mountains), Baden, and Warwickshire, and sown in January, February, and March of the year 1847, in pans filled with a compost of decomposed vegetables and a small portion of sandy loam, and placed in a vinery. In a short time the seeds began to vegetate; and when the plants were fairly up, sprinklings of water were administered occasionally, and air given at every convenient opportunity. When the plants had acquired sufficient size and strength they were pricked out in pans, and afterwards potted off in 3-inch pots, and nurtured up till they were fit to be removed into pits made of turf, which were previously prepared for them, about 24 feet in length by 5 feet 6 inches in width, 3 feet high at the back, and 1 foot 10 inches in front. Temporary plates and braces were provided and placed on the pits, and frames made and covered with felt. This being done, the pots containing the plants were placed in the pits on cinder ashes, and air was given as often as the weather would permit. The plants there became properly inured to the climate. A piece of land in one of the fields was prepared by frequent deep ploughings during winter, and properly pulverised, and afterwards thrown up into ridges about 3 feet from each other; a quantity of leaf-mould and about one-fourth part of farm-yard manure, with a small portion of quick-lime, well incorporated together, was placed between the ridges, and the plants turned out of the pots with their balls entire in the beginning of June, and were gradually earthed up, as required, in the usual manner. In taking up the different kinds, Mr. Lawford stated that many of the principal tubers were much diseased, and particularly the parts nearest the surface.

When it is recollected that the produce of a single seed weighed 4 lbs. 9 oz., the inference derivable from this experiment is, that a crop of potatoes equally good as one raised from sets may be obtained from seed in the first year by this mode of treatment; and it does not appear that the seeds must be sown unusually early; for good-sized tubers, though not equal to the above, obtained from seeds sown as late as May, were shown by R. Wrench, Esq., of London Bridge. These latter consisted of three sorts, two from Baden and one

from the Himalayan mountains. They were stated to have been sown in May in boxes, and raised in a little green-house erected above Mr. Wrench's warehouse in the city, where they vegetated; and when they had become strong, they were planted out in his garden at Norwood an inch or two deep, and at the same distance apart at which potatoes are usually planted. Along with these were also specimens of Cameron's Guayaquil Potatoes, the produce of two tubers saved from the wreck of the Tweed. These were large coarse-looking potatoes, the largest tuber of which weighed 2 lbs. 9 oz. Finally, a fair sample of potatoes raised from seed sown last spring, was shown by Mr. M'Ewing, gardener to Colonel Wyndham, of Petworth, Sussex. Mr. Charlwood, of Covent-garden, sent a collection of large and variously shaped Squashes and Gourds.

NOVELTIES FROM THE SOCIETY'S GARDEN. Calceolaria cuneifolia, a new yellow-flowered species raised from Bolivian seeds; Mr. Fortune's Aconitum autumnale, a pale blue-flowered Chinese species resembling Aconitum Napellus; Mastacanthus sinensis, a pretty blue-flowered herbaceous plant, which will prove useful; Solanum lycioides, and the same Flax-leaved Acacia (A. linifolia) which was shown at the last meeting, still in flower and promising to go on blooming for some time to come. The fruit from the Garden consisted of the following Pears: Forelle; Figue de Naples, a variety requiring to be gathered early, or it is not melting; Broom Park, a valuable hardy Pear raised by the late Mr. Knight; and De Parrain, a little known sort obtained from the Continent, a great bearer, and a variety which succeeds well as a standard.

BOOKS PRESENTED.

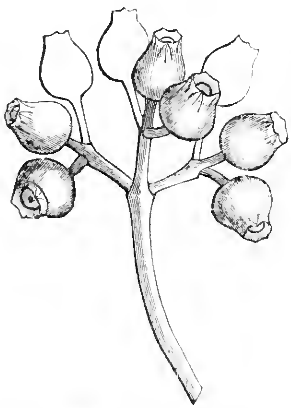
Calendario dello Agricoltore per l'anno 1847. From Signor Giuseppe Inzenga, of Palermo.
Noticia Histórica de la Familia Salvador de Barcelona. By Don Pedro Andrès Pourret. From Don José Salvador.
The Botanical Register for November. From the Publishers.
The Athenæum for September and October. From the Editor.
Index XI. Seminum quæ Hortus Botanicus Imperialis Petropolitanus pro Mutua Commentatione offert. From the Imperial Botanic Garden.
Nova Acta Academiæ Naturæ Curiosorum. Vol. XXI., Part 2. From the Academy at Breslau.

December 7, 1847. (REGENT STREET.)

AWARDS. *Large Silver Medal.* To Messrs. Veitch and Son, of Exeter, for a beautiful new Gesnerwort, named Agalmyla staminea (Fig. A), obtained from Java, through their collector, Mr. Thomas Lobb. The plant exhibited was the

Fig. A

first that had bloomed in this country; it was a stout, herbaceous, creeping-stemmed plant, with large elliptic leaves, from the axil of which was produced a dense cluster of rich velvety crimson flowers, like those of some Æschynanthus. Though beautiful, even in the condition in which it was shown, it, however, conveyed no sufficient idea of what it may be expected to become when better grown; for in a dried specimen from Java, which was also exhibited along with it, instead of one bunch of flowers on a branch it had seven, clothing the shoot for about two feet with its gay blossoms. Being a plant of easy cultivation, it will no doubt become one of the gayest inhabitants of our stoves. With it was a branch of Medinilla speciosa, bearing a fine cluster of purplish red fruit, of which the accompanying woodcut will give some idea, and which are nearly as handsome as its semitransparent pink flowers of summer. This is also a Java plant, whose broad concave fleshy leaves, large bunches of flowers in summer, and fruit in autumn, deservedly place it among stove plants of first-rate character.



Banksian Medals: To Mr. Dobson, gardener to Mr. Beck of Isleworth, for a collection of Orchids, containing the beautiful Lælia autumnalis, two Oncids, the best variety of Epidendrum Skinneri, E. vitellinum, the New Holland Pitcher-plant (Cephalotus follicularis), three kinds of Physurus, and a silvery veined Anæctochilus from Java—the latter four plants in ornamental green slate boxes. To Mr. Roberts, gardener to the Duke of Cleveland, at Raby Castle, for grapes, consisting of Muscat of Alexandria, and two other varieties, apparently Black Prince and Syrian. Mr. Roberts stated that these were not sent as specimens of superior cultivation, but merely as examples of his ordinary table-fruit, of which he mentioned that he often cuts as much as 12 lbs. a-day for dessert.

Certificate of Merit: To Mr. Catleugh, of Chelsea, for a dwarf specimen of Clerodendron splendens, measuring $2\frac{1}{2}$ feet in height, and as much through, and bearing upwards of 20 flower spikes, of which 12 were in perfection. This

was the third time the same plant had flowered in twelve months.

MISCELLANEOUS SUBJECTS OF EXHIBITION. A perfect bloom of Camellia Donkelaeri, from John Allnutt, Esq. of Clapham, who stated that the plant which had borne it last year produced self-coloured flowers only, but that this year the flowers were coming as usual, finely variegated.—Roots of Oxalis Deppei, which have been found to be a useful addition to our winter vegetables in the way of Scorzonera, Salsify, &c., from Mr. Cockburn, gardener to the Earl of Mansfield at Kenwood.

NOVELTIES FROM THE SOCIETY'S GARDEN. Vriesia psittacina, an extremely pretty stove-plant, nearly related to Pitcairnia, and one which possesses the good property of remaining long in beauty; Clematis pedicellata, a nearly hardy evergreen species, which blooms twice in the year, viz., in spring and autumn; and the Peruvian Boldoa fragrans, an evergreen greenhouse shrub, whose flowers exhibit little beauty, but whose fruit, leaves, and wood emit a highly aromatic odour.

BOOKS PRESENTED.

The Quarterly Journal of the Geological Society. No. 12. From the Society.
Annals of the Lyceum of Natural History of New York. Nos. 8 and 9. Vol. IV. From the Lyceum.
Botanical Register for December. From the Publishers.

January 18, 1848. (REGENT STREET.)

ELECTIONS. The Baroness Newborough, Glynnliver, Caernarvon; Charles William Strickland, Esq., Boynton, Yorkshire; and Mark Faviell, Esq., Luydale Hall, near Pontefract.

AWARDS. *Certificates of Merit:* To Messrs. Veitch and Son, of Exeter, for a new half-shrubby species of Hindsia [?], forming a dense tuft about 6 inches in height, ornamented with rosy purple tubular blossoms. "It was raised," wrote Messrs. Veitch, "from seeds sent from the Organ mountains of Brazil, by Mr. William Lobb; we find it to do well in a moderately warm greenhouse." It appears to be a free bloomer, and may prove a useful addition to winter-flowering plants of third-rate character. To Mr. Mills, F.H.S., for a Providence Pine Apple, handsome, well formed, and remarkable for the redness of the scales with which the pips were furnished. It weighed 8 lbs. To Mr. Davis, of Oak Hill, East Barnet, for Black St. Peter's Grapes, from a very late house—perfectly ripened, and finely swelled and coloured.

Miscellaneous subjects of Exhibition. Black Hamburgh grapes, plump and fresh, but rather deficient in colour, from G. Crawshay, Esq., of Colney Hatch. These were stated to have been grown according to Mr. Crawshay's usual plan, viz., in a house to which no fire-heat had been applied except in November and December, when small fires were lighted merely to dry up damp. The vineries at Colney Hatch are well ventilated, and to this circumstance chiefly is no doubt to be attributed Mr. Crawshay's success in keeping his grapes plump and fresh till this late period. From Mr. Vick, of Chichester, some Black Hamburgh Grapes. "The sample sent," wrote Mr. Vick, "is part of 7 lbs. which I cut this morning (16th January) from a vine growing upon the south front of my dwelling-house. The season of 1847, although dry and warm, was very unfavourable for ripening grapes out of doors, from the circumstance of their being three weeks or a month later than usual in coming into blossom; and the season being far advanced before they began to colour, I thought I would endeavour to assist them by placing some small cucumber lights, which I had lying by me, over the vine, in a sloping direction, so as to project from the house about 2½ feet: this, with the assistance of a net suspended from the lights, was all the protection they received, and which has preserved them to the present period." The grapes exhibited were quite ripe and well coloured. Mr. Hewitt, gardener to J. Purday, Esq., of Bayswater, sent a Black Antigua Pine Apple, forming a perfect pyramid, and weighing 4 lbs. 10 oz. Mr. Glendinning, of the Chiswick Nursery, showed a Gesnerwort, resembling G. Hondensis or breviflora; and finally, from Mr. Bowers, of Busbridge, Godalming, Surrey, was a watering-pot tube, whose novelty consisted in its having a valve at the tip, moved by a lever working on a spring. "I have found this simple contrivance," says Mr. Bowers, "most useful in watering pot plants in houses, particularly on wide benches, &c., the operator, without half the usual labour and loss of water, being enabled to supply every plant, however dissimilar, with its due portion to a drop. The watering-pot being held between both hands, the thumb of the left hand placed on the lever lifts the valve, and allows much or little water to flow according to the requirements of the plant; and the instant the pressure is removed the water is shut off. The lever is worked as easily as the key of a German flute. With this invention plants can be watered without washing the soil out of the pots, which is apt to be done by

the common tube; and, moreover, with this tube, a large pot can be employed for watering plants of all sizes."

NOVELTIES FROM THE SOCIETY'S GARDEN. Whitfieldia lateritia, a stove Acanthad, from the interior of Sierra Leone. It forms a low spreading evergreen shrub, whose branches terminate in racemes of flowers, of which the calyx, corolla, and bracts are of a dull brick colour. They want brilliancy, however, to render the plant attractive.

BOOKS PRESENTED.

Journal of the Royal Agricultural Society of England. Vol. VIII., Part 2. From the Society.
The Sixteenth Annual Report of the Royal Horticultural Society of Cornwall. From the Society.
L'Orto Botanico di Padova, nell' anno 1842, descritto dal Professore Roberto di Visiani. From the Author.
Dei Vantaggi che l'Agricoltura può ricavare dallo studio dell' Entomologia, Memoria da Carlo Passerini. From the Author.
Mr. Bohn's Catalogue of Books. From Mr. Bohn.
An Experimental Inquiry into the cause of the Ascent and Descent of the Sap, by G. Rainey, M.R.C.S.E. From Mr. Pamplin, the Publisher.
Flora Batava, Nos. 148 and 149. From His Majesty the King of Holland.
The Athenæum for the months of November and December. From the Editor.
Del Metodo e delle Avvertenze che si usano nell Orto Botanico di Padova, per la Cultura, Fecondazione, e Fruttificazione della Vaniglia, Memoria del Professore Roberto di Visiani. From the Author.

February 15, 1848. (REGENT STREET.)

ELECTIONS. John Thompson, Esq., Holme Island, near Milnethorpe; and Mr. James Gray, Danvers Street, Chelsea.

AWARDS. *Knightian Medal:* To Mr. Mylam, gardener to Sigismond Rucker, Esq., F.H.S., for Orchids; more especially a remarkably well-flowered specimen of Cœlogyne flaccida.

MISCELLANEOUS SUBJECTS OF EXHIBITION. Seedling Cinerarias from Mr. Ivery of Peckham, and blooms and plants of Pelargoniums, &c., from Mr. Kendall's Polmaise-house at Stoke Newington. The latter were exhibited as evidence in favour of this system of heating, in consequence of an opinion having been expressed, that "if the Pelargonium could be successfully bloomed in a house so heated, the system would be worthy of notice." In reference to this point Mr. Kendall remarked—"I have now the pleasure of submitting to the inspection of the meeting some Pelargoniums so grown and so bloomed, with a degree of success beyond my expectation; for every gardener is aware how difficult it is to bloom the Pelargonium during the winter months. In the first place I would direct attention to some flowers of a Scarlet Pelargonium, from which I have been cutting, through *the whole of the winter*, upon an average, six dozen

trusses of bloom weekly. I would next point to an *old stump* of P. album multiflorum, one out of about two dozen such *old stumps* that were placed in my Polmaise-house, with the expectation of gathering from them a few early blooms. Had the plants been shifted, or any particular care taken of them, there is no doubt that the blossoms would have been much finer; but I rather chose to let them be bloomed under a disadvantage. The cut flowers produced are from those *old stumps.* I also exhibit a small specimen plant of Beck's Cleopatra, in an 8-inch pot, grown by the side of the others, but with a little more care. It is not yet quite in bloom, but its trusses promise to be all I can wish. It is short and bushy, and needs no sticks to support it. So much for Pelargoniums and Polmaise. The Camellia is quite at home in my house, plants having been blooming with me the whole of the winter without dropping their buds; so also are the Acacia, the Cytisus, the Cineraria, the Fuchsia, the Rose, and the Cyclamen, all of which I have had in good bloom in my Polmaise-house through the winter. The house in which these were grown was built last spring, and is heated by one of Mr. Lewis's ten-guinea stoves. It is 60 feet long, 18 feet 6 inches wide, and 9 feet high, span-roofed, faces north-east and south-west, and consequently is fully exposed to the keen searching winds of last month, during which I had no difficulty in keeping up a temperature of 56° Fahr." Mr. Dauris, gardener to Dr. Dymond, of Bolton Hall, produced an Enville Pine Apple weighing 4 lbs. 6 oz. It was stated to have been cut from a plant $2\frac{1}{2}$ years old, which was planted out in a pit heated by steam. The Pines at Bolton Hall were mentioned to have been much infested by scale some years ago; but having been dressed at that time with a composition (mentioned at page 79, Part I. of volume I.) resembling black paint, invented by Mr. Dauris, this pest has not reappeared, although it is stated at the page just referred to that the mixture did not succeed with other plants.

NOVELTIES FROM THE SOCIETY'S GARDEN. A well-bloomed Inga pulcherrima, whose gay crimson flowers remain in beauty for a considerable time after being cut; and Echeveria retusa, a pretty dwarf species, with leaves edged with red, raised from seeds received from Mr. Hartweg in February, 1846, and said to have been collected on rocks near Angangueo, in Mexico.

Flowers of Chimonanthus fragrans and grandiflorus, to-

gether with cuttings of Pear-trees, were distributed. The Pears consisted of Knight's Monarch, a hardy and excellent bearer, whose fruit—melting and rich—ripens in December and January; Eyewood, also a hardy, middle-sized, roundish Pear, of rich flavour, ripening in October and November; Broom Park, a middle-sized roundish fruit, which ripens in December and January, partaking of the flavours of the Melon and Pine-apple; and, finally, Beurré d'Amanlis, a variety identical with Beurré d'Amalis of the Society's Catalogue of Fruits; but it was stated that B. d'Amanlis was the proper name, it having originated at Amanlis, a parish about 18 miles from Rennes. It is an excellent Pear, large and pyriform, pale green dotted with brown, sometimes acquiring a tinge of red next the sun. It partakes of the flavour of the Brown Beurré, but the tree is much hardier. It ripens in October.

It was announced that the usual Seeds were ready for distribution to Fellows.

BOOKS PRESENTED.

The Quarterly Journal of the Geological Society. No 13. From the Society.
The Journal of the Royal Geographical Society. Part 2. From the Society.
The Athenæum for January, 1848. From the Editor.
Le bon Jardinier Almanach pour 1848. From M. Vilmorin.
Transactions of the Linnean Society. Vol. XX, Part 2. From the Society.
Tables des Comptes Rendus des Séances de l'Académie des Sciences. Tome 24. From the Academy.

March 7, 1848. (REGENT STREET.)

ELECTIONS. J. A. R. Jackson, M.D., Brentwood, Essex; and Mr. A. Henderson, Nurseryman, Wellington Road, St. John's Wood.

AWARDS. *Banksian Medals:* To Messrs. Veitch and Son, of Exeter, for a tall plant of Siphocampylus microstoma, a greenhouse Lobeliad with which few can vie in brilliancy of colour. The flowers are produced in dense terminal clusters, each flower being fully 2 inches in length and of an exceedingly rich scarlet crimson. Of this fine plant, which was detected in New Grenada by Mr. Purdie, there are two varieties, a darker and a paler, this being the darker one. To Messrs. Fairbairn, of Clapham, for a remarkably fine specimen of Erica aristata major, measuring 2½ feet high and as much through, and finely flowered. To Messrs. Rollisson, of Tooting, for a collection of Orchids consisting of four varieties of Lycaste Skinneri, a Vanda from Java nearly related to V. Roxburghi, but handsomer; and a specimen of Ansellia africana, a somewhat scarce Orchid from the island of Fernando Po. To Mr. Rae, Gardener

to J. J. Blandy, Esq., F.H.S., for Orchids, especially for Lælia flava, Oncidium cornutum, the beautiful orange-scarlet-flowered Sophronitis grandiflora from the Organ mountains, and a plant of Chysis bractescens.

Certificate of Merit: To Mr. Williams, Gardener to C. B. Warner, Esq., F.H.S., for Odontoglossum pulchellum, with 8 spikes of white flowers, which smell as sweetly as those of a lily of the valley.

MISCELLANEOUS SUBJECTS OF EXHIBITION. A small Odontoglossum pulchellum and a Pelargonium of good colour and properties, a seedling of 1846, from Mr. Beck, F.H.S. The latter had been forced, and was sent to show that Pelargoniums of better properties than those usually employed for forcing could be successfully subjected to that process. The plant in question had been introduced into heat on the 27th of January, at which time the blossom-buds were just beginning to appear, and, although the night temperature had been kept at from 55° to 60°, the blossoms were rich in colour, and the plant dwarf and short-jointed. A specimen of a mode of glazing hothouse sashes was exhibited, by which the inventor (Mr. Rishton, of Kendal) stated that he had obviated breakage by frost and other evils to which common glazing is known to be subject. The remedy consisted in each pane having its own rebate, the upper end of which dipped so as to elevate the lower end of the pane a little above a cross-bar of some metal, which receives the upper ends of the succeeding panes, and forms a receptacle for putty. The superincumbent pane is thus kept clear of the bar, and all collection of condensed water is consequently prevented, while free ventilation is afforded through the open lap. Whether this plan will fully answer all that it is said it will effect, however, remains in some measure to be proved.

NOVELTIES FROM THE SOCIETY'S GARDEN. Mr. Fortune's Daphne (D. Fortuni), coming nicely into flower; and the pretty little hardy Himalayan Primula denticulata.

Cuttings of the following Pears were distributed: March Bergamot, Shobden Court, Jean de Witte, and Thompson's. The first resembles the autumn Bergamot in size and form; it is an excellent Pear, ripening, as its name implies, in March, but will even keep later. The second is a middle-sized fruit, obovate, rich, and sugary; ripe in January and February. This and the preceding are seedlings of the late Mr. Knight's—hardy, and, as yet, rather thorny, which is generally the case with recent seedlings. The thorns,

Mr. Knight observed, serve for the defence of the young plants; but their production gradually gives way to that of fruit-spurs. The Jean de Witte is also a middle-sized Pear, obovate in form, partaking of the flavour of the Glout Morceau, but keeps longer; it ripens in January and February. The last, viz., Thompson's, is a seedling variety, which was sent with many others to the Society's garden by Dr. Van Mons, of Louvain; this, however, proved to be the best of them, and some are of opinion that its flavour is exceeded by that of no other Pear. It is middle-sized, obovate, and ripens in November. All the above varieties are hardy, good bearers, and do not require walls.

Book Presented.

The Athenæum for February. From the Editor.

Special General Meeting. After the business of the ordinary meeting had closed, the Society resolved itself into a Special General Meeting, summoned by advertisement and through the Post-office, for the purpose of electing a new Member of Council, in the room of R. W. Barchard, Esq., deceased. R. Hutton, Esq., took the chair.

Mr. George Glenny rose to move the adjournment of this meeting; but his motion not having been seconded, the ballot proceeded, when the Chairman having appointed

Peter Pole, Esq.
R. S. Streatfield, Esq.
R. B. Pollard, Esq.

} to be Scrutineers,

they reported that 23 Fellows of the Society had voted unanimously for

W. W. Salmon, Esq.,

who was then declared to be duly elected.

March 21, 1848. (Regent Street.)

At this meeting Mr. Robert Gordon rose and read a letter from Joseph Davis, lately a clerk in the Society's employment, representing that the affairs of the Society required investigation, which letter he delivered to the Chairman for the information of the Council. The Chairman on receiving the letter on the part of the Council stated that Joseph Davis had been employed as Accountant Clerk for many years; that he had been dismissed for neglect of duty and gross misconduct, and that the Council had upon his dismissal immediately placed the accounts of the Society in the hands of a public accountant.

ELECTIONS. R. Creyke, Esq., Rawcliffe Hall, Selby; and Mr. G. Wheeler, Nurseryman, Warminster.

AWARDS. *Banksian Medals:* To Messrs. Veitch and Son, of Exeter, for a Camellia called Storyi, a seedling raised by W. H. Story, Esq. It had a clean, somewhat ample, fine-looking foliage, and flowers in the way of those of Imbricata—very perfect, circular in outline and having the crown well up. In colour the flower is lighter than Imbricata, with a rosy pink centre gradually becoming darker on the outer petals. To Messrs. Loddiges, of Hackney, for a collection of Orchids; but more especially for two well-flowered specimens of Dendrobium macrophyllum. To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a new Dendrobium, apparently a variety of D. Griffithii, but a striking one, the flowers being white, relieved in their centre by a broad patch of orange.

Certificates of Merit: To Messrs. Rollisson, of Tooting, for a good plant of a Begonia from Oaxaca, apparently B. platanifolia. To Messrs. Veitch for a new Tropæolum raised from seeds received from the Andes of Cuenca; to the flowers of Moritzianum it added the foliage of Canariense. To Mr. Kendall, of Stoke Newington, for a beautiful seedling Cineraria, named "Newington Beauty"—a full-sized, well-shaped flower, having a dark disk surrounded by pure white. Its petals are deeply margined with crimson, terminating at the points with crimson purple; the flowers are slightly cupped, and barren—a singular circumstance which gives to the disk a clean appearance.

MISCELLANEOUS SUBJECTS OF EXHIBITION. Kidney Beans, sent by Mr. Todd, Gardener to Sir E. Filmer, Bart., from a Polmaise house at East Sutton Park. These were sown in the last week in January, at which time forcing was commenced, and it was stated that since that period this mode of heating had given perfect satisfaction, and that even during the greatest cold that has been experienced since that time, a temperature of from 70° to 80° could be maintained with ease and little care. It was mentioned that Cucumbers grew well in the same house. Mr. Silver, Gardener to the Rev. H. Pole, sent a cut specimen, in flower, of Weigela rosea, with a view to prove that this hardy plant (one of the best of Mr. Fortune's Chinese introductions) forces well. The plant was placed in a vinery "at work," and, on showing flower, was removed to a conservatory, adapting itself to the most common-place treatment. Messrs. Warner and Sons, of Jewin Street, sent a garden-

engine, whose novelty consisted in its having attached to the top of the tube a flat shovel-like plate, moving on a spring, for spreading the water. This invention was so contrived that tubes and plates of different sizes could be put on or taken off at pleasure. Specimens of fabrics, made in Madagascar from the Raphia Palm tree, were exhibited by Admiral Sir W. Gage. One was a mat of some beauty; the other was a striped cloth, which it was mentioned was probably prepared from the fibre of the leaf.

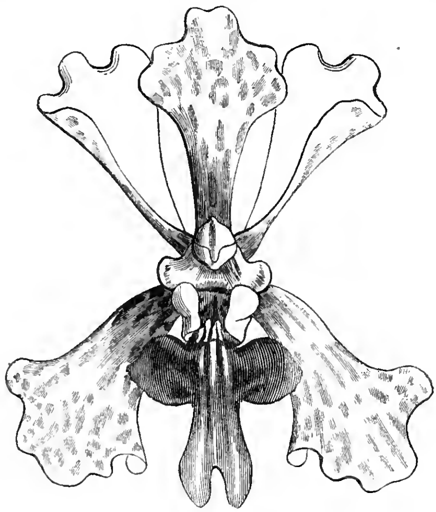
NOVELTIES FROM THE SOCIETY'S GARDEN. Mr. Fortune's Forsythia viridissima, which has been found to force well; Azaleas obtusa and squamata, and the Greek Cyclamen (C. repandum), with purple sweet-scented blossoms.

Seeds of Berberis asiatica, a half-evergreen shrub, which had been found to be very suitable for cottage-garden fences, and of the true Killerton Asparagus, were furnished by Sir Thomas Acland, Bart., M.P., and distributed among the Fellows. Cuttings of the following Pears and Apples were also distributed:—Comte de Lamy, a middle-sized, roundish Pear, whose flesh is melting, and tastes like sugar rendered delicious by the addition of the Pear flavour; it ripens in October; the tree bears well as a standard. Althorp Crassane, an excellent standard Pear, raised by the late Mr. Knight, at Downton Castle; it is figured and described in the Society's 'Transactions,' and the variety has since fully maintained all the good qualities ascribed to it; it ripens in October and November; the tree is hardy and a good bearer. Boston Russet, one of the few American Apples which prove to be adapted for our climate. Attempts to grow the celebrated Newtown Pippin have generally resulted in the production of something so different from the original as scarcely to be recognised, but the Boston Russet is a valuable acquisition as a dessert Apple from January till April; it is a middle-sized fruit, whose flesh is rich and sugary, with somewhat of the Ribston Pippin flavour; and, finally, Mère de Ménage, a good late-keeping kitchen Apple; it is of German origin. The tree is vigorous and a good bearer, the fruit being very large, roundish, and dark red.

April 4, 1848. (REGENT STREET.)

ELECTIONS. Col. Vernon-Harcourt, St. Clair, Ryde, Isle of Wight; the Rev. A. Clive, Whitfield, Hereford; and J. S. Gregory, Esq., 41, Bedford-square.

AWARDS. *Large Silver Medal*: To Messrs. Veitch and Son, of Exeter, for the magnificent new Vanda suavis sent from Java by Mr. Lobb, having a long spike of large flowers, whose white petals are beautifully spotted all over with brown, the lip being violet. Of the general appearance of the individual flowers of this fine species some idea may be gathered from the accompanying woodcut. Messrs. Veitch stated that in the Orchid house it is highly fragrant.



Knightian Medals: To Mr. Mylam, gardener to S. Rucker, Esq., F.H.S., for a collection of Orchids, more especially for plants of Phalænopsis amabilis, the Duke of Devonshire's Galeandra (G. Devoniana), and the ivory-blossomed Cymbidium (C. eburneum). To Messrs. Loddiges, of Hackney, for Orchids, especially for Bletia campanulata, Epidendrum Stamfordianum, Cymbidium eburneum, and Dendrobium densiflorum; the latter with eight large spikes of yellow flowers.

Banksian Medals: To Messrs. Veitch and Son, for a plant of Æschynanthus speciosus, the most brilliant of the genus, bearing six terminal clusters, each consisting of some eighteen or twenty long orange-scarlet flowers. "This," wrote Messrs. Veitch, "we consider the finest of all the Æschynanths. The habit and foliage are good; the erect mode of flowering, and the gaudy flowers combined with the abundance of bloom, render it a very ornamental and de-

sirable plant. Young plants three inches high bloom freely." To Messrs. Henderson, of Pine Apple-place, for a large collection of Hyacinths in bloom, comprising some of the newest and best varieties.

Certificates of Merit: To Mr. Mylam, gardener to S. Rucker, Esq., for fine specimens of Erica trossula, mundula, and Neillii. To J. Montgomery, Esq., F.H.S., for a Gesnera remarkable for its graceful and airy appearance, having been grown without the sticks to which such plants are too often stiffly tied, and which so much detract from their beauty. To Mr. Glendinning, of the Chiswick Nursery, for Cyrtoceras reflexum. "This," wrote Mr. Glendinning, "has not in my estimation been sufficiently appreciated as an ornamental stove-plant, for by a very little care it can be induced to bloom in great abundance at any period of the year. The same plant, in fact, can be made to flower about every alternate month. This is the third time the plant exhibited has bloomed during the past winter. Its cultivation, too, is remarkably easy—a circumstance, no doubt, of much importance to many. A temperature suitable in the winter-culture of the Cucumber will answer admirably for the Cyrtoceras. It likes heat and moisture; and, when potted in sandy peat, intermixed with potsherds, and plunged in a brisk bottom heat, there can be no question as to its successful culture and abundant flowering at all seasons."

Miscellaneous Subjects of Exhibition. Statice frutescens and imbricata, two new varieties from the Canaries, from Mr. Albert of Fulham; a rosy crimson-flowered Rhododendron, a hybrid from arboreum, with eight heads of flowers, each head forming a cone six inches deep, and as much across at the base, from Mr. Salter, gardener to G. Stone, Esq., of Parson's Green, Fulham; and a dish of Apples, called Mannington's Pearmain, in excellent condition, from Mr. Cameron of Uckfield. This variety differs from all others at present in cultivation; it is middle-sized, reddish, somewhat russeted, and said to be remarkable for its late-keeping properties.

Novelties from the Society's Garden. Ixora javanica, a beautiful orange-red flowered species; the double-blossomed Spiræa prunifolia; Henfreya scandens; and a plant of the Winter Violet Grass (Ionopsidium acaule, or Cochlearia acaulis), a little Portuguese annual which is beginning to find its way into gardens. The latter was sent to the Society a few years ago by the Duc de Palmella.

BOOK PRESENTED.

The Athenæum for March. From the Editor.

April 18, 1848. (REGENT STREET.)

ELECTIONS. W. W. Smith, Esq., 10, Watling-street; S. Child, Esq., Rownall, near Leek, Staffordshire; W. Campion, jun., Esq., 10, Eaton-place, Belgrave-square; and G. W. Blundell, Esq., Ince Blundell Hall, near Great Crosby, Liverpool.

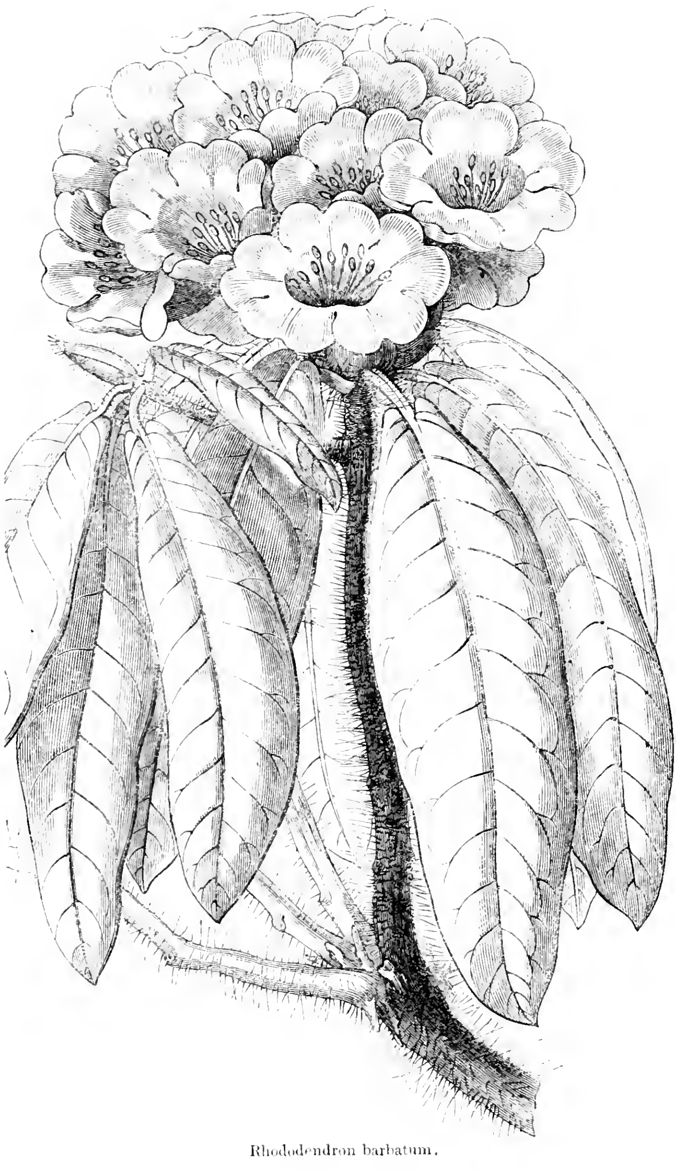
AWARDS. *Large Silver Medal:* To Messers. Veitch and Son, of Exeter, for a small flowering plant of Fuchsia spectabilis, a species probably upon the whole the finest yet known. The flowers are a deep crimson; the petals flat and bright rich red; and the stigma very large and pure white, forming a fine contrast with its rosy bed. The leaves are broad, oblong, very firm, and a dark velvety green, although they have scarcely any hairs. The flowers grow horizontally from the axils of the leaves. It was found by Mr. Lobb on the Andes of Cuenca, in Peru, and was at first supposed to be the same as F. loxensis of Humboldt and Bonpland, but proves to be a distinct species. In Peru it is stated to grow from two to four feet high—"a magnificent thing; quite the queen of Fuchsias."

Knightian Medal: To Mr. Kyle, gardener to R. Barclay, Esq., Leyton, for a plant of Eriostemon neriifolium, than which, for its size, it was perhaps impossible to produce a better specimen of good gardening. It formed a dense pyramid nearly five feet high, profusely clothed with white starry blossoms to the very pot.

Banksian Medals: To Messrs. Henderson, of Pine Apple-place, also for a plant of Eriostemon neriifolium, nearly seven feet in height, well flowered, but an older and less perfect specimen than the one just mentioned. To Mr. Glendinning, of the Chiswick Nursery, for a tall specimen, well flowered, of Henfreya scandens.

Certificates of Merit: To Messrs. Veitch, for Cantua pyrifolia, a rare Peruvian Phloxwort, with cream-coloured flowers, which, though produced in abundance, are too dingy-looking to render it a plant of first-rate character. To Mr. Davis, of Oak Hill, East Barnet, for Black Hamburgh and Sweetwater Grapes.

MISCELLANEOUS SUBJECTS OF EXHIBITION. From the Marchioness of Westminster, a coloured drawing of the beautiful rose-coloured Rhododendron, named barbatum, which lately flowered for the first time in this country at Eaton Hall, in



Rhododendron barbatum.

Cheshire. It was stated to have been obtained from the north of India; but, unlike the Indian species, which generally have loose heads of flower, if the Ceylon R. zeylanicum be excepted, its flower-heads were close and compact, the individual flowers being short and round, and freer from spots than most other Indian kinds.

NOVELTIES FROM THE SOCIETY'S GARDEN. Euonymus fimbriatus, a greenhouse shrub from the north of India, whose flowers exhibit no great beauty, but whose pale green fringed leaves are handsome, especially in early spring; also fruit from a plant in the conservatory of what the French call the Hermaphrodite Orange, being an orange and a lemon apparently combined in the same fruit, a singular production grown in Syria and Egypt, concerning the origin of which much speculation has been indulged in, but as yet without eliciting anything satisfactory. Most of the specimens were irregular in form, the larger portion of the surface exhibiting the rough, spongy exterior of the lemon, the other portions having the colour and thin smooth skin of the orange. This peculiarity, however, is never found to extend below the surface; on cutting one of the fruit open the interior proved to be all of one kind, and looked like that of a sweet lemon.

May 1, 1848. (REGENT STREET.—ANNIVERSARY.)

The following Fellows of the Society, viz.—

J. E. Denison, Esq., M.P.
J. H. Schröder, Esq.
Dr. Daniel,

were elected new Members of the Council, in the room of—

Col. Baker,
R. H. Solly, Esq.
T. Edgar, Esq.

The following Fellows of the Society were elected officers for the ensuing year, viz.—

The Duke of Devonshire, President.
Robert Hutton, Esq., Treasurer.
J. R. Gowen, Esq., Secretary.

The Annual Report from the Council and Auditors was read (see p. 170).

It was moved by Joseph Dobinson, Esq., seconded by R. S. Streatfield, Esq., and carried unanimously, that the Report read be adopted.

Mr. Robert Gordon delivered to the Chairman a letter addressed

to him by Joseph Davis, dated this day, and requested that it might be laid before the Council.

Mr. George Glenny signified his intention of sending a written communication to the Council.

Peter Pole, Esq., moved a vote of perfect confidence in the Council, which was seconded by Mr. John Glenny, and carried unanimously.

It was moved by Robert Wrench, Esq., seconded by C. W. Dilke, Esq., and carried unanimously, that the best thanks of the meeting be given to T. Edgar, Esq., the retiring Treasurer, for the continual zeal, attention, and urbanity which he had unvaryingly displayed in his office as Treasurer.

It was moved by Mr. George Glenny, seconded by R. S. Streatfield, Esq., and resolved unanimously, that the suggestion made by the Council in their Report, whether as to the amendment of the Bye-Laws or the improvement of the Charter, be adopted by the meeting, and that the Council be empowered to act accordingly.

May 2, 1848. (Regent Street.)

Awards. *Large Silver Medal:* To Messrs. Veitch and Son, of Exeter, for Cantua bicolor, the magic tree of the Peruvian Indians, a green-house shrub of easy cultivation and much beauty. The plant exhibited had only two flowers on it, which served merely to show their size and colour; but in its native habitat it was stated to form a branching shrub, each of whose shoots terminates in a cluster of campanulate carmine-coloured flowers, the tubes of which are yellow, and nearly half covered by the green calyx. It promises to be a great acquisition to gardens.

Knightian Medal: To Messrs. Rollisson, of Tooting, for a collection of Orchids, consisting of Oncidium bifolium, Cyrtochilum flavescens, Burlingtonia fragrans, and Arpophyllum giganteum. The latter is a most beautiful Guatemala Orchid, producing erect spikes of small purple flowers, which are arranged with the greatest regularity, presenting more the appearance of a spike of little shells than of flowers. In its native country this fine Orchid was stated to produce spikes from twelve to eighteen inches in length, covered with these beautiful little shell-like flowers.

Certificates of Merit: To Messrs. Veitch, for a new Dendrobium, nearly related to longicornu, from the Indian province of Moulmein. To Mr. Henderson, of Wellington Nursery, St. John's Wood, for a collection of seedling Cinerarias, all of remarkably dwarf habit.

MISCELLANEOUS SUBJECTS OF EXHIBITION. A small plant from Messrs. Veitch, of a variety called flavum of their beautiful Java Rhododendron, the flowers being considerably paler than those of the original species; a seedling Rhododendron, and Mr. Fortune's Weigela rosea, from Mr. Gaines, of Battersea; and boxes of beautiful Pansy blooms, from plants which had been grown in pots in a cold frame, from Mr. Turner, of Chalvey.

NOVELTIES FROM THE SOCIETY'S GARDEN. The white-flowered climbing plant Henfreya scandens, grown in a medium-sized pot, and twisted down upon itself so as to assume the form of a small shrub—a mode of management by which it blooms freely and is kept in small compass.

BOOKS PRESENTED.

The Athenæum for April. From the Editor.
Littel's Living Age. From the Publishers.
Verhandlungen des Vereins fur Beförderung des Gartenbaues in den Königlich Preussischen Staaten. Vol. 19, Part 1. From the Horticultural Society of Prussia.

May 20, 1848. (GARDEN EXHIBITION.)

The weather on this occasion was doubtful, and one or two heavy showers of rain fell in the course of the day. As regards the exhibition, such a display of perfect gardening was perhaps never before witnessed. Not only was there an increase in the number of subjects exhibited, but each and all the plants produced were models of perfect cultivation. This was the distinguishing feature of the show. The number of Visitors amounted to 3238, exclusive of exhibitors and persons officially employed.

The AWARD was as follows:—

Certificate of Honour: 1. To Messrs. Frazer, of Lea Bridge Road, for a collection of thirty stove and greenhouse plants. 2. To Messrs. Veitch, of Exeter, for twenty species of Exotic Orchids.

Large Gold Medal: 1. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of thirty stove and greenhouse plants. 2. To Mr. Rae, gardener to J. J. Blandy, Esq., F.H.S., for twenty species of Exotic Orchids.

Gold Knightian Medal: 1. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of fifteen stove and greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids. 3. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten species of the same. 4. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park,

Beckenham, for fifteen varieties of Cape Heath. 5. To Messrs. Fairbairn, for the same.

Gold Banksian Medal: 1. To Mr. W. Cole, gardener to H. Colyer, Esq., of Dartford, Kent, for a collection of fifteen stove and greenhouse plants. 2. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of ten stove and greenhouse plants. 3. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for ten species of Exotic Orchids. 4. To Mr. W. Cock, F.H.S., for twelve new varieties of Pelargonium in 8-inch pots. 5. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 6. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of greenhouse Azaleas in twelve varieties. 7. To the same, for tall Cacti in flower. 8. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for twelve varieties of Roses, in pots. 9. To Mr. Francis, of Hertford, for the same. 10. To Messrs. Rollisson, of Tooting, for fifteen varieties of Cape Heath. 11. To Mr. Iveson, gardener to the Dowager Duchess of Northumberland, at Sion, for a collection of uncommon Tropical Fruits.

Large Silver Gilt Medal: 1. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for a collection of fifteen stove and greenhouse plants. 2. To Mr. Pawley, of Bromley, for a collection of ten stove and greenhouse plants. 3. To Mr. Jack, gardener to R. G. Loraine, Esq., Wallington, for the same. 4. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for the same. 5. To Mr. Carson, for ten species of Exotic Orchids. 6. To Mr. Eyles, of Roehampton, for six species of the same. 7. To Mr. Hamp, gardener to James Thorne, Esq., of South Lambeth, for a collection of six Amaryllids. 8. To Mr. Staines, of Middlesex-place, New-road, for twelve new varieties of Pelargonium, in 8-inch pots. 9. To Mr. Thos. Gaines, F.H.S., for the same. 10. To the same, for six varieties of Pelargonium, in 11-inch pots. 11. To Mr. Parker, gardener to J. H. Oughton, Esq., of Roehampton, for the same. 12. To Messrs. Frazer, for a collection of greenhouse Azaleas in twelve varieties. 13. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for the same in six varieties. 14. To Mr. Bruce, gardener to Boyd Miller, Esq., of Tooting, for tall Cacti in flower. 15. To Mr. May, gardener to E. Goodheart, Esq., for Leschenaultia biloba major. 16. To Mr. Bruce, for Aphelexis sesamoides. 17. To Mr. Pamplin, of Lea Bridge Road, for Pimelea spectabilis. 18. To Mr. Mylam, gardener to S. Rucker, Esq., jun., for nine varieties of Cape Heath.

19. To Messrs. Frazer, for the same. 20. To Mr. T. Gaines, F.H.S., for six fancy Pelargoniums. 21. To Mr. Thomas Dawson, of Panshanger, Herts, for twelve varieties of Roses, in pots. 22. To Messrs. Lane, of Great Berkhampstead, for the same. 23. To Mr. Iveson, gardener to the Dowager Duchess of Northumberland, for Napoleona imperialis.

Certificate of Excellence: 1. To Mr. Bruce, gardener to Boyd Miller, Esq., for a collection of ten stove and greenhouse plants. 2. To Mr. Malyon, gardener to T. Brandram, Esq., Lea Grove House, Blackheath, for the same. 3. To Mr. Glendinning, F.H.S., for the same. 4. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for six species of Exotic Orchids. 5. To Mr. Robinson, gardener to J. Simpson, Esq., of Thames Bank, Pimlico, for twelve varieties of Pelargonium, in 8-inch pots. 6. To Mr. Staines, for six varieties of the same, in 11-inch pots. 7. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for nine varieties of Cape Heath. 8. To Mr. W. P. Ayres, nurseryman, Blackheath, for the same. 9. To Mr. Ambrose, Battersea, for six fancy Pelargoniums. 10. To Mr. Dobson, for twelve varieties of Roses in pots. 11. To Messrs. Paul, Cheshunt, for the same. 12. To Mr. Francis, Hertford, for a collection of Roses in fifty varieties. 13. To Mr. Hill, gardener to Thomas Davis, Esq., F.H.S., for Pimelea decussata. 14. To Messrs. Frazer, for Boronia serrulata. 15. To Mr. Pamplin, for Campylia holosericea. 16. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of greenhouse Azaleas in twelve varieties. 17. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the same in six varieties. 18. To Messrs. Veitch, of Exeter, for Mitraria coccinea.

Large Silver Medal: 1. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six species of Exotic Orchids. 2. To Mr. Gaines, for a collection of six species of Calceolaria, in 11-inch pots. 3. To Messrs. Lane, of Great Berkhampstead, for a collection of Roses in fifty varieties. 4. To Mr. G. Jack, gardener to R. G. Loraine, Esq., for nine varieties of Cape Heath. 5. To Mr. Pamplin, of Lea Bridge Road, for the same. 6. To Mr. Malyon, gardener to Thomas Brandram, Esq., for Erica vestita coccinea. 7. To Messrs. Frazer, for Erica ventricosa breviflora. 8. To Mr. Whiting, gardener to H. T. Hope, Esq., F.H.S., for Campylia holosericea delicata. 9. To Messrs. Ivery and Son, of Dorking, for a collection of greenhouse Azaleas in six varieties. 10. To Mr. Eyles. for Torenia asia-

tica. 11. To Messrs. Frazer, for Epacris grandiflora. 12. To Mr. Glendinning, for Pimelea Hendersoni. 13. To Mr. Taylor, gardener to J. Coster, Esq., for a collection of Hardy Ferns. 14. To Mr. Iveson, gardener to the Dowager Duchess of Northumberland, for Platycerium grande. 15. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., for a Providence Pine Apple. 16. To Mr. Lawrence, of Isleworth, for the same. 17. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for Black Hamburgh Grapes. 18. To Mr. Davis, of East Barnet, for the same. 19. To Mr. Davis, gardener to Baron Goldsmid, F.H.S., for Sweetwater Grapes. 20. To the same, for White Frontignan Grapes.

Silver Knightian Medal: 1. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six Calceolarias, in 11-inch pots. 2. To Mr. Francis, of Hertford, for a collection of Yellow Roses in six varieties. 3. To Mr. Hamp, gardener to James Thorne, Esq., for Erica Cavendishii. 4. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Franciscea hydrangeæformis. 5. To Mr. Williams, gardener to C. B. Warner, Esq., for a collection of Hardy Ferns. 6. To Mr. Mylam, gardener to S. Rucker, Esq., F.H.S., for a new species of Cœlogyne, from Borneo. 7. To Mr. Jack, gardener to R. G. Loraine, Esq., for Camarotis purpurea. 8. To Mr. Malyon, for nine varieties of Cape Heath. 9. To Mr. Pawley, of Bromley, for the same. 10. To Mr. Mylam, for the best named collection of plants. 11. To Mr. M'Rae, gardener to Joseph Dent, Esq., Ribston Hall, Wetherby, for a Providence Pine Apple. 12. To Mr. Braid, gardener to H. Perkins, Esq., F.H.S., for specimens of Grapes in pots. 13. To Mr. Turnbull, gardener to the Duke of Marlborough, for the heaviest bunch of Grapes exhibited by private growers. 14. To Mr. Davis, of East Barnet, for the heaviest bunch among market-gardeners. 15. To Mr. Ingram, gardener to her Majesty, for Black Hamburgh Grapes. 16. To Mr. Mitchell, of Brighton, for Black Hamburgh Grapes. 17. To Mr. Busby, gardener at Stockwood Park, Luton, for Dutch Sweetwater Grapes. 18. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., for Nectarines. 19. To Mr. Monro, gardener to Mrs. Oddie, Colney House, for Oranges in a pot. 20. To Mr. Drummond, gardener to C. H. Leigh, Esq., of Ponty Poole Park, for the heaviest Melon exhibited. 21. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for the best flavoured Melon.

Silver Banksian Medal: 1. To Mr. Tye, gardener to W. H. Gillett, Esq., of Clapham Park, for six Calceolarias, in 11-inch pots. 2. To Mr. Bruce, gardener to Boyd Miller, Esq., for Erica translucens rosea. 3. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for nine varieties of Cape Heath. 4. To Mr. Frazer, of Lea Bridge Road, for Boronia pinnata. 5. To Mr. John Waterer, of Bagshot, for twelve hardy Rhododendrons. 6. To Messrs. Standish and Noble, of Bagshot, for Rhododendron blandyanum. 7. To the same, for eighteen hardy seedling Azaleas. 8. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten hothouse Ferns. 9. To Messrs. Veitch, for a yellow hardy Viola from Patagonia. 10. To the Messrs. Rollisson, for the second best-named collection of plants. 11. To Mr. Lawrence, of Isleworth, for a Queen Pine Apple. 12. To Mr. Brown, gardener to C. W. Packe, Esq., M.P., for a Providence Pine Apple. 13. To Mr. Turnbull, gardener to the Duke of Marlborough, for Black Hamburgh Grapes. 14. To Mr. Gardiner, gardener at Weston House, , for Peaches. 15. To the same, for Nectarines. 16. To Mr. Ingram, gardener to her Majesty, at Frogmore, for Cherries. 17. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for Strawberries in pots. 18. To Mr. Davis, of East Barnet, for British Queen Strawberries. 19. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for Keen's Seedling Strawberries. 20. To Mr. Toy, gardener at Oatlands Palace Gardens, Weybridge, for Keen's Seedling Strawberries. 21. To Mr. Drummond, gardener to C. H. Leigh, Esq., Ponty Poole Park, for the second best flavoured Melon.

Certificates of Merit: 1. To Mr. Gaines, for a Seedling Hybrid Pelargonium, "Ne plus ultra." 2. To Mr. Pamplin, for Eriostemon buxifolium. 3. To Messrs. Standish and Noble, of Bagshot, for an Azalea, "Glory of Sunning Hill." 4. To Mr. Ingram, gardener to her Majesty, for a Seedling Petunia. 5. To Messrs. Veitch, for a Seedling Erica, "Perelegans." 6. To Mr. H. Waterer, F.H.S., for cut Azaleas. 7. To Messrs. Veitch, for Tropæolum polyphyllum. 8. To the same, for Statice imbricata. 9. To the same, for a new species of Boronia. 10. To Mr. May, gardener to E. Goodheart, Esq., for the third best named collection of plants. 11. To Mr. Groom, gardener to H. Bentley, Esq., of Leeds, for Peaches. 12. To Mr. Toy, gardener at Oatlands Palace Gardens, Weybridge, for British Queen Strawberries.

June 6, 1848. (REGENT STREET.)

ELECTIONS. The Duchess Dowager of Northumberland; the Lord Wharncliffe, Wortley Hall, Sheffield; W. Evans, Esq., M.P., Allestree, Derby; E. Pain, Esq., Battersea; and W. D. Haggard, Esq , Hammersmith.

AWARDS. *Knightian Medal:* To Messrs. Henderson, of Pine Apple Place, for a Hippeastrum, allied to H. Johnsoni; a magnificent specimen of Pimelea Hendersoni, 3 feet high and as much through, and loaded with blossoms; and a capital plant of Abelia (Vesalia) floribunda, a half-hardy Mexican species, with bunches of long rosy red pendulous flowers and small bright green leaves. It was stated to have been standing out in a cold pit all winter. It dislikes heat, in which it is very subject to red spider.

Banksian Medals: To Messrs. Loddiges, for a collection of Orchids; but more especially for plants of Dendrobium Dalhousianum, the true Cyrtochilum hastatum, and Brassia cuspidata. To Mr. Wood, of Norwood, for a collection of alpine plants in pots, consisting of Linaria hepaticæfolia, Silene quadridentata and alpestris, Alyssum minimum, Potentilla tridentata, Erpetion reniformis, Cotyledon lutea, Gypsophila repens, Thymus lanuginosus, Statice Caroliniana, Saxifraga ceratophylla, Veronica taurica, Stachys Corsica, Bellium minutum, Sedum stellatum and dasyphyllum, and Sempervivum arachnoideum. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., for good specimens of Bellegarde Peaches and Violet Hative Nectarines: with these Mr. Chapman also sent a lateral shoot taken from the tree on which the Nectarines grew. Finding it necessary several times to cut these laterals away in order that they might not shade or interfere with the swelling of the fruit, to Mr. Chapman's surprise the tree became a second time full of blossom. He cut all away but the one sent, on which a young fruit had set. The case was stated to be analogous to pears producing flowers and fruit on the present year's wood when hard pruned in.

Certificates of Merit: To Mr. Groom, of Clapham Rise, for a collection of hardy deep-brown coloured Lilies, remarkable for their dwarfness, the result of crossing the common orange-flowered bulbiferous lily with the Japanese L. atrosanguineum. The best were Nabob, Voltaire, Atlas, Vulcan, and Louise-Philippe. To Mr. Smith, gardener to J. Anderson, Esq., of Regent's Park, for a Guatemala Epidendrum, which looked like a large variety of E. fragrans, but

which might possibly prove an undescribed species. It is extremely sweet scented. To Mr. Ambrose, of Battersea, for a seedling "fancy" Pelargonium named Defiance, a pretty dark variety in the way of Jehu, whose petals have a clear narrow light edge.

MISCELLANEOUS SUBJECTS OF EXHIBITION. A nice collection of variegated plants from Mr. Wood, of Norwood. Cut flowers of two kinds of Lathyrus from Messrs. Veitch, and plants of a new purple-flowered dark-eyed Oxalis from Peru. A seedling Verbena, named Emperor of China, dark-red with a white eye, from Mr. Ivery, of Peckham. A dish of fruit, and a plant bearing upwards of 200 fruit in all stages of growth, of some unnamed Strawberry related to the Old Black Strawberry, from Mr. Cuthill, of Camberwell. It was stated to be very early, and excellent for preserving: also, from the same grower, a dish of ash-leaf Kidney Potatoes, fine looking, and quite free from disease. Mr. Craggs, gardener to Sir Thomas Acland, Bart., M.P., F.H.S., sent a bundle of Asparagus from Killerton, weighing (100 heads) 13 lbs. 4 oz. The sticks were remarkably large, with no undue proportion of white about them. From Mr. Restell, of Croydon, came what he called a "Plant and Seed Protector," being a triangular looking-glass, which, suspended from one end, kept constantly moving and reflecting the objects presented to it, and thereby frightened away the birds. Samples of remarkably neat-looking garden netting were shown by Messrs. J. Merriman and Co., of Houndsgate, Nottingham.

NOVELTIES FROM THE SOCIETY'S GARDEN. A fine large well-flowered specimen of Dendrobium sanguinolentum; Cereus crenatus, a pale straw-coloured species from Honduras, a profuse bloomer, the flowers being less evanescent than those of the night-blowing Cereus, for they last two or three days; Statices imbricata and frutescens, new species from the Canaries; Captain Grey's Swainsona (S. Greyana); Chænostoma polyanthum, a suffruticose half-hardy plant of considerable beauty, and an abundant bloomer; Ligustrum japonicum, a half-hardy evergreen shrub, with large panicles of white blossoms; Exostemma aquatica, and Torenia Asiatica.

BOOKS PRESENTED.

Transactions of the Zoological Society of London. Vol. III., Part 5. From the Society.
The Athenæum for May. From the Editor.
The Quarterly Journal of the Geological Society. No. XIV. From the Society.
Flora Batava. Nos. CL. and CLI. From His Majesty the King of Holland.
Verhandlungen der K. K. Landwirthschafts-gesellschaft in Wien, und Aufsätze vermischten œkonomischen inhaltes. Vol. IV., Part 2. Vienna, 1847.

June 10, 1848. (Garden Exhibition.)

A pouring rain and a sunless sky rendered this meeting a failure as regarded company. Notwithstanding, however, that the beating of the rain-drops on the tents almost drowned the sound of the musical instruments, and that the lawn had become a swamp, 870 Fellows and their friends had the courage to face the storm. But if it was a failure as a meeting, as an exhibition it was a triumph. The Azaleas of May were hardly missed, so rich and varied were the tints of the gaudy plants that took their place, and so admirable their cultivation. The fruit, too, was better than in May; in some respects it was excellent, and it was this time produced in considerable quantity.

The Award was as follows:—

Certificates of Honour: 1. To Messrs. Frazer, of Lea Bridge Road, for a collection of thirty stove and greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Large Gold Medal: To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of thirty stove and greenhouse plants.

Gold Knightian Medals: 1. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of fifteen stove and greenhouse plants. 2. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for ten species of Exotic Orchids. 3. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for fifteen varieties of Cape Heath. 4. To Messrs. Rollisson, for the same.

Gold Banksian Medals: 1. To Mr. Cole, gardener to H. Colyer, Esq., of Dartford, Kent, for a collection of fifteen stove and greenhouse plants. 2. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for a collection of ten stove and greenhouse plants. 3. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten species of Exotic Orchids. 4. To Mr. W. Cock, F.H.S., for twelve new varieties of Pelargonium in 8-inch pots. 5. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 6. To Messrs. Lane, of Great Berkhampstead, for twelve varieties of Roses in pots. 7. To Mr. May, gardener to E. Goodheart, Esq., Beckenham, Kent, for fifteen varieties of Cape Heath. 8. To Messrs. Fairbairn, of Clapham, for the same. 9. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for tall Cacti in flower.

Large Silver Gilt Medals: 1. To Mr. Kyle, gardener to R.

Barclay, Esq., of Leyton, for a collection of fifteen stove and greenhouse plants. 2. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham, for a collection of ten stove and greenhouse plants. 3. To Mr. Bassett, gardener to R. S. Holford, Esq., F.H.S., for ten species of Exotic Orchids. 4. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for six species of Exotic Orchids. 5. To Mr. Stains, of Middlesex-place, New-road, for twelve new varieties of Pelargonium, in 8-inch pots. 6. To Mr. Gaines, F.H.S., for the same. 7. To Mr. Parker, gardener to J. H. Oughton, Esq., of Roehampton, for six varieties of Pelargonium, in 11-inch pots. 8. To Mr. Gaines for the same. 9. To Messrs. Paul, of Cheshunt, for twelve varieties of Roses in pots. 10. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for nine varieties of Cape Heath. 11. To Mr. Ayres, nurseryman, Blackheath, for the same. 12. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six distinct species of Pelargonium. 13. To Mr. Gaines, F.H.S., for six fancy Pelargoniums. 14. To Mr. Glendinning, F.H.S., for a collection of Statices. 15. To Mr. Iveson, gardener to the Duchess Dowager of Northumberland, F.H.S., for Gardenia Stanleyana. 16. To the same, for a collection of uncommon Tropical Fruits. 17. To Messrs. Frazer, Lea Bridge Road, Essex, for Ixora coccinea. 18. To Messrs. Veitch, of Exeter, for a new species of Hoya from India.

Certificates of Excellence: 1. To Mr. Jack, gardener to R. G. Loraine, Esq., Wallington, for a collection of ten stove and greenhouse plants. 2. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for ten species of Exotic Orchids. 3. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the same. 4. To Mr. Jack, for six species of the same. 5. To Mr. Robinson, gardener to J. Simpson, Esq., Thames Bank, Pimlico, for twelve new varieties of Pelargonium, in 8-inch pots. 6. To Mr. Stains, of Middlesex Place, New Road, for six varieties of Pelargonium, in 11-inch pots. 7. To Mr. Terry, gardener to Lady Puller, Youngsbury, for twelve varieties of Roses in pots. 8. To Mr. Francis, of Hertford, for the same. 9. To Messrs. Paul, of Cheshunt, for a collection of Roses in fifty varieties. 10. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for nine varieties of Cape Heath. 11. To Messrs. Pamplin, of Lea Bridge Road, for the same. 12. To Mr. Jack, for Leschenaultia biloba. 13. To Mr. Epps, F.H.S., for Aphelexis grandiflora. 14. To Mr. Wood, Norwood, for twenty hardy dwarf Herbaceous Plants. 15. To Mr.

Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for Vanda Batemanni.

Large Silver Medals: 1. To Mr. Bruce, gardener to Boyd Miller, Esq., Tooting, for a collection of ten stove and greenhouse plants. 2. To Mr. Pawley, Bromley, for the same. 3. To Mr. Malyon, gardener to T. Brandram, Esq., Lea Grove House, Blackheath, for the same. 4. To Mr. Bruce, for six species of Exotic Orchids. 5. To Mr. Eyles, Roehampton, for the same. 6. To Messrs. Veitch, of Exeter, for Phalænopsis grandiflora. 7. To Mr. Wiggins, gardener to S. Sanders, Esq., Staines, for six varieties of Pelargonium, in 11-inch pots. 8. To Mr. Kinghorn, gardener to Lord Kilmorey, Orleans House, Twickenham, for six varieties of Calceolaria, in 11-inch pots. 9. To Mr. Gaines, F.H.S., for the same. 10. To Messrs. Lane, of Great Berkhampstead, for a collection of Roses in fifty varieties. 11. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for twelve varieties of Roses, in pots. 12. To Mr. Terry, gardener to Lady Puller, Youngsbury, Herts, for a collection of Roses in twenty-five varieties. 13. To Mr. Kinghorn, for Erica Cavendishii. 14. To Messrs. Frazer, Lea Bridge Road, Essex, for Erica vestita coccinea. 15. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of greenhouse Azaleas in six varieties. 16. To the same, for Dipladenia crassinoda. 17. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for Aphelexis sesamoides. 18. To Mr. Falconer, gardener to A. Palmer, Esq., Cheam, for Leschenaultia formosa. 19. To Messrs. Pamplin, Lea Bridge Road, Essex, for Dillwynia clavata. 20. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten species of Hardy Ferns. 21. To Messrs. Veitch, of Exeter, for Browallia Jamesoni. 22. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for a Queen Pineapple. 23. To Mr. Ingram, gardener to Her Majesty at Frogmore, for Black Hamburgh Grapes. 24. To Mr. Davis, of Oak Hill, East Barnet, for the same. 25. To Mr. Ingram, for Muscat of Alexandria Grapes.

Silver Knightian Medals: 1. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of ten stove and greenhouse plants. 2. To Mr. Glendinning, F.H.S., for the same. 3. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Dendrobium nobile. 4. To Mr. R. Ellis, Woolwich, for twenty-four varieties of Pinks. 5. To Mr. Turner, Chalvey, Windsor, for the same. 6. To Mr. Laing, Twickenham, for a collection of Roses, in

fifty varieties.* 7. To Mr. Driver, gardener to W. Broadhurst, Esq., F.H.S., for the same, in twenty-five varieties. 8. To Messrs. Lane, of Great Berkhampstead, for a collection of Yellow Roses, in six varieties. 9. To Mr. Bruce, gardener to Boyd Miller, Esq., Tooting, for Erica mutabilis. 10. To Mr. Pawley, Bromley, for Erica elegans. 11. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten hothouse Ferns. 12. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Calystegia pubescens. 13. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for ten species of hardy Ferns. 14. To Messrs. Henderson, of Pine Apple Place, Edgeware Road, for Chironia glutinosa. 15. To Mr. Mylam, gardener to S. Rucker, Esq., F.H.S., for the best-named collection of Plants (no error in twenty). 16. To Mr. Davis, Oak Hill, East Barnet, for a Providence Pineapple. 17. To Mr. Barnes, gardener to J. C. Whitmore, Esq., of Apley Park, Bridgenorth, for the heaviest bunch of Black Hamburgh Grapes, 2 lbs. 5 oz. 18. To Mr. Davis, of Oak Hill, East Barnet, for the heaviest bunch of Black Hamburgh Grapes in the Market Gardeners' Class, 3 lbs. 4¼ oz. 19. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for Black Hamburgh Grapes. 20. To Mr. Mitchell, of Brighton, for the same. 21. To Mr. Evans, gardener to C. N. Newdigate, Esq., of Arbury Hall, Warwickshire, for Violet Hative Peaches. 22. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the heaviest Melon, a Hybrid Greenflesh, 6 lbs. 3½ oz. 23. To Mr. Gadd, of Betchworth, for the heaviest Melon in the Market Gardeners' Class, a Cantaloupe, 7 lbs. 2½ oz. 24. To Mr. Fleming, for the best-flavoured Melon, a Hybrid between the Hoosainee and Ispahan. 25. To Mr. Gadd, for the best-flavoured Melon in the Market Gardeners' Class, a sort unnamed. 26. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., for Nectarines. 27. To Mr. Geo. Stanly, for Calceolarias.

Silver Banksian Medals: 1. To A. Rowland, Esq., F.H.S., for a collection of Roses in fifty varieties. 2. To Mr. J. Halliday, of Woolwich, for twenty-four varieties of Pinks. 3. To Messrs. Norman, of Woolwich, for the same. 4. To Messrs. Paul, for a collection of Yellow Roses in six varieties. 5. To Mr. Malyon, gardener to T. Brandram, Esq., of Blackheath, for Erica ventricosa superba. 6. To Messrs. Rollisson, of Tooting, for Erica Cavendishii. 7.

* Mr. Francis was disqualified by showing four of his Roses in pairs instead of in threes.

To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for a collection of Roses in twenty-five varieties. 8. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Aphelexis sesamoides purpurea. 9. To Mr. Wood, of Norwood, for ten species of hardy Ferns. 10. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a species of Browallia. 11. To Mr. Bassett, gardener to R. S. Holford, Esq., F.H.S., for a new Cœlogyne from Borneo. 12. To Mr. Gerrie, gardener to Sir J. Cathcart, Bart., F.H.S., for Stanhopea oculata. 13. To Mr. Bruce, for Phymatanthus tricolor. 14. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for the second best-named collection of Plants (three errors in thirty). 15. To Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., for a Montserrat Pineapple. 16. To Mr. Cox, gardener to M. Ricardo, Esq., of Kiddington House, Oxon, for Black Prince Grapes. 17. To Mr. Chapman, of South Lambeth, for Black Hamburgh Grapes. 18. To Mr. Challis, gardener to Miss Irvine, of Egham, for Sweetwater Grapes. 19. To Mr. Toy, gardener to Mr. Harrison, Oatlands Palace Gardens, Weybridge, for Black Frontignan Grapes.* 20. To Mr. Turnbull, gardener to the Duke of Marlborough, F.H.S., for Royal George Peaches. 21. To Mr. Davis, of Oak Hill, East Barnet, for Noblesse Peaches. 22. To Mr. Foggo, gardener to the Marquis of Abercorn, F.H.S., for Nectarines. 23. To the same, for Figs. 24. To Mr. Snow, gardener to Earl de Grey, F.H.S., for Early Purple Guigne Cherries. 25. To Mr. Elliott, gardener to J. B. Boothby, Esq., Twyford Abbey, for British Queen Strawberries. 26. To Mr. Lydiard, of Bath Easton, Bath, for Alice Maude Strawberries. 27. To Mr. Parsons, gardener to A. George, Esq., of Enfield, for Keen's Seedling Strawberries. 28. To Mr. Ingram, for the second best-flavoured Melon (Beechwood).

Certificates of Merit: 1. To Mr. Jack, gardener to R. G. Loraine, Esq., Wallington, for Dipladenia crassinoda. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for Gloxinia Teuchleri. 3. To Mr. Glendinning, for four plants of Erica Cavendishii. 4. To Mr. Bassett, gardener to R. S. Holford, Esq., F.H.S., for Vanda fuscoviridis. 5. To Messrs. Rollisson, for the third best-named collection of Plants (two errors in fifteen). 6. To Mr. May, gardener

* The Judges also commended highly the Black Hamburghs from Mr. Foggo and Mr. Barnes, for which, however, they had no medal at their disposal.

to E. Goodheart, Esq., Langley Park, Beckenham, for the fourth best-named collection of Plants (two errors in fifteen). 7. To Mr. Groom, gardener to H. Bentley, Esq., Leeds, for Royal George Peaches. 8. To Mr. Evans, gardener to C. N. Newdigate, Esq., of Arbury Hall, Warwickshire, for Brinion Nectarines. 9. To Mr. Braid, gardener to H. Perkins, Esq., F.H.S., for Figs. 10. To Mr. Rust, gardener to J. MacLaurin, Esq., F.H.S., for Alice Maude Strawberries. 11. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for Keen's Seedling Strawberries. 12. To Mr. Snow, gardener to Earl de Grey, F.H.S., for the third best-flavoured Melon—"Snow's Hybrid Green-fleshed."

July 4, 1848. (Regent Street.)

Elections. Lord Ashburton, Bath House, Piccadilly; T. Heathcote, Esq., 10, Holles-street, Cavendish-square; and J. Eisenberg, Esq., 14, Cockspur-street, Pall Mall.

Awards. *Banksian Medals:* To Mr. Glendinning, of the Chiswick Nursery, for a nice specimen of the Brazilian Allamanda Schottii. To Mr. Henderson, of Wellington Nursery, St. John's Wood, for a collection of Cape and fancy Pelargoniums, the most beautiful of the Cape species being ardens, bipinnatifidum, and flexuosum. To Mr. Chapman, Gardener to J. B. Glegg, Esq., F.H.S., for a Providence Pine-apple, weighing 9 lbs. 13½ oz. To Mr. Burton, Gardener to J. Strutt, Esq., for a well-formed and finely-swelled Enville Pine, weighing 6 lbs.; it was stated to be the production of a sucker which had been left on an old stool in a pot. To Messrs. Loddiges, for a collection of Orchids, but more especially for Aerides affine, Epidendrum vitellinum majus, Brassia brachiata, Oncidium leucochilum, and Stanhopea Martiana.

Certificates of Merit: To Messrs. Veitch, for Lisianthus frigidus, a yellow-flowered Mexican species of some promise. To Mr. Moore, Gardener to the Earl of Auckland, F.H.S., for a well-flowered specimen of a sweet-scented Amaryllis, named Natalensis, which, if not the same, was stated to much resemble A. Forbesii, a species introduced by the Horticultural Society some twenty years ago. The following is Mr. Moore's statement concerning it:—"I received two bulbs of the above in July, 1846, both being then perfectly sound, and of equal size. The one now exhibited I kept dry and cold until the following spring; the other was potted immediately; it made an effort to grow at the com-

mencement of winter, but that very weakly, and it is still in a sickly state, the bulb feeling quite soft. The one kept dry I placed on a shelf in a vinery that I had commenced to force: it grew vigorously, but did not flower. I kept it growing till the beginning of July, when I gradually withheld water, and finally dried it off, keeping it the remainder of the summer on a shelf near the glass, and again through the winter dry and cold. It was again placed in the vinery this spring, the heat at the time ranging from 48° to 55°, where it soon began to grow. I watered it sparingly at first, but increased the supply progressively as the plant advanced, occasionally giving it weak liquid manure. About the middle of June it showed its first flower-sheath, and it was then removed to the green-house." To Mr. Dodds, Gardener to Colonel Baker, F.H.S., for a Providence Pineapple, weighing 7 lbs. 4½ oz., being the best of nine pines of the same variety whose weights were respectively 8 lbs. 11 oz., 7½ lbs., 7 lbs. 12 oz., 7 lbs. 10 oz., 7 lbs. 5 oz., 6 lbs. 13 oz., 6 lbs. 7 oz., and 6 lbs. These were stated to have been cut from plants twenty-three months old, grown in peat and in pots.

Miscellaneous Subjects of Exhibition. A Peruvian Thibaudia, a pretty Vaccinium-like shrub, with long, waxy, rosy pink tubular blossoms, tipped with white, from Messrs. Veitch; a variegated variety of Thunbergia aurantiaca, named Doddsii, from Mr. Dodds; Potatoes, from a cottager's garden near Dorking, exhibiting the return of the disease of 1845 in its worst form, from Mr. Whiting, of the Deepdene; Grapes literally covered with mildew (Oidium Tuckeri), an evil unusually abundant this year, from Mr. Allnutt, of Clapham; Blooms of Hoyle's Scipio Pelargonium, from Mr. Silverlock; a light Fuchsia, called Snowdrop, from Mr. Keynes, of Salisbury; and a Phlox, named depressa, a hybrid between P. Brownii and Drummondii, from Mr. Henderson, of the Wellington Nursery.

Novelties from the Society's Garden. Mr. Fortune's double-flowered Convolvulus (Calystegia pubescens), which, though hardy, makes a useful green-house twiner; Indigofera decora, also a Chinese plant, remarkable for the length of time it continues in flower; Mr. Lobb's Æschynanth (Æ. Lobbianus); Salvia hians, a pretty hardy, herbaceous, blue and white flowered perennial from Cashmere; Monardella undulata, a sweet-scented hardy annual, raised from seeds sent from California by Mr. Hartweg; and Adamia versicolor, a hydrangea-like plant, with flowers which, when

in bud, are at first white; but gradually change to pink, and when fully expanded the interior is a violet blue. The flowers should be succeeded by little berries of a fine blue colour, and which are as pretty as the flowers; but attempts to fruit it in this country have hitherto failed.

Books Presented.

Journals of Travels in Assam, Burma, Bootan, Affghanistan, and the neighbouring countries; Icones Plantarum Asiaticarum, Part I.; and Notulæ ad Plantas Asiaticas, Part I.; being posthumous papers bequeathed to the Honourable the East India Company, by William Griffith, Esq. From the East India Company.

Transactions of the American Philosophical Society, Vol. 10, Part 1; and Proceedings of the American Philosophical Society, Vol. 4, Nos. 36, 37, 38, and 39. From the Society.

The Athenæum for June. From the Editor.

The Journal of the Royal Geographical Society. Vol. 18, Part 1. From the Society.

Sur les Causes qui limitent les Espèces Végétales du côté du Nord en Europe et dans les régions analogues; par M. Alph. de Candolle, being an extract from the ninth volume of the Annales des Sciences Naturelles. From the Author.

Erster und zweiter Jahresbericht und Mittheilungen des Gartenbau-Vereins für Neuvorpommern und Rügen. Bericht über die erste Neuvorpommersche Fruchtausstellung vom 30 September bis 8 October, 1845. Statuten des Gartenbau-Vereins für Neuvorpommern und Rügen. From the Horticultural Society of Neuvorpommern and Rügen.

July 12, 1848. (Garden Exhibition.)

This was as good a July exhibition as ever graced the garden. The plants were numerous, and the fruit plentiful and good—some of it excellent. The day was hot without being oppressive, and the beautiful grounds at Chiswick House, through the kindness and liberality of the Duke of Devonshire, being thrown open to the visitors, the scene, enlivened by the music, was one of real enjoyment. The number present was 14,084, viz. 227 Fellows, 13,823 visitors admitted by ordinary tickets, and 34 by ambassadors' tickets. This is the largest number on record. On the 13th of June, 1846, there were only 13,421, and the 11th of June, 1842, only 13,351.

The Award was as follows:—

Certificates of Honour: 1. To Messrs. Frazer, of Lea Bridge Road, for a collection of thirty Stove and Greenhouse Plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Large Gold Medals: 1. To Mr. Cole, gardener to H. Colyer, Esq., of Dartford, Kent, for a collection of thirty Stove and Greenhouse Plants. 2. To Mr. Rae, gardener to J. J. Blandy, Esq., F.H.S., for twenty species of Exotic Orchids.

Gold Knightian Medals: 1. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of fifteen Stove and Greenhouse Plants. 2. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for ten species of Exotic

Orchids. 3. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for fifteen varieties of Cape Heath. 4. To Messrs. Rollisson, Tooting, for the same.

Gold Banksian Medals: 1. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of fifteen Stove and Greenhouse Plants. 2. To Mr. Jack, gardener to R. G. Loraine, Esq., Wallington, Surrey, for a collection of ten Stove and Greenhouse Plants. 3. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for ten species of Exotic Orchids. 4. To Mr. Cock, F.H.S., for twelve new varieties of Pelargonium, in 8-inch pots. 5. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 6. To Messrs. Paul, Cheshunt, for twelve varieties of Roses in pots. 7. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for fifteen varieties of Cape Heath. 8. To Mr. Epps, F.H.S., for the same.

Large Silver-Gilt Medals: 1. To Mr. Malyon, gardener to T. Brandram, Esq., Blackheath, for a collection of fifteen Stove and Greenhouse Plants. 2. To Mr. Taylor, gardener to J. Coster, Esq., Streatham, for a collection of ten Stove and Greenhouse Plants. 3. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for ten species of Exotic Orchids. 4. To Mr. Gerrie, gardener to Sir J. A. Cathcart, Bart., F.H.S., for six species of Exotic Orchids. 5. To Mr. Terry, gardener to Lady Puller, Youngsbury, for twelve varieties of Roses in pots. 6. To A. Rowland, Esq., F.H.S., for the same. 7. To Mr. Francis, of Hertford, for the same. 8. To Messrs. Veitch, Exeter, for fifteen varieties of Cape Heath. 9. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for nine varieties of Cape Heath. 10. To Mr. Ayres, Blackheath, for the same. 11. To Mr. Stains, Middlesex Place, New Road, for six distinct species of Pelargonium. 12. To the same, for twelve new varieties of Pelargonium, in 8-inch pots. 13. To Mr. Gaines, F.H.S., for the same. 14. To the same, for six fancy Pelargoniums. 15. To Mr. Parker, gardener to J. H. Oughton, Esq., Roehampton, for six varieties of Pelargonium, in 11-inch pots. 16. To Mr. Glendinning, F.H.S., for six species of Statice. 17. To Messrs. Frazer, for Sollya linearis. 18. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for Tabernæmontana coronaria. 19. To Messrs. Veitch, for Pleroma elegans.

Certificates of Excellence: 1. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of ten Stove and Greenhouse Plants. 2. To Mr. Bruce, gardener to Boyd Miller, Esq., Tooting, for the same. 3. To Mr.

Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six species of Exotic Orchids. 4. To Mr. Iveson, gardener to the Duchess Dowager of Northumberland, F.H.S., for six species of Achimenes. 5. To Messrs. Lane, of Great Berkhampstead, for twelve varieties of Roses in pots. 6. To Messrs. Paul, for a collection of cut Roses in fifty varieties. 7. To Mr. Taylor, gardener to J. Coster, Esq., for nine varieties of Cape Heath. 8. To Messrs. Pamplin, of Lea Bridge Road, for the same. 9. To Mr. Miller, gardener to R. Mosley, Esq., Pine-apple Place, Edgeware Road, for six scarlet Pelargoniums. 10. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six distinct species of Pelargonium. 11. To Mr. Stains, for six fancy Pelargoniums. 12. To the same, for six varieties of Pelargonium, in 11-inch pots. 13. To Mr. Gaines, F.H.S., for the same. 14. To Messrs. Veitch, for six new Hardy Evergreens in pots. 15. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six varieties of Tall Cacti, in flower. 16. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Allamanda cathartica. 17. To Mr. Rollisson, for Clerodendron affine. 18. To Messrs. Veitch, for a new species of Echites.

Large Silver Medals: 1. To Mr. Pawley, of Bromley, for a collection of ten Stove and Greenhouse Plants. 2. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for six species of Exotic Orchids. 3. To Mr. Ingram, gardener to Her Majesty at Frogmore, for Stanhopea tigrina. 4. To Mr. Knott, gardener to the Rev. C. Pritchard, F.H.S., for six species of Achimenes. 5. To Messrs. Lane, for a collection of cut Roses, in fifty varieties. 6. To A. Rowland, Esq., F.H.S., for the same, in twenty-five varieties. 7. To Mr. Riddell, gardener to G. Wynn, Esq., Charlton, Kent, for Erica tricolor coronata. 8. To Mr. Ayres, for Erica infundibuliformis. 9. To Mr. Gaines, F.H.S., for six Calceolarias, in 11-inch pots. 10. To Mr. Edwards, of Wace Cottage, Holloway, for twenty-four varieties of Carnations. 11. To the same, for twenty-four varieties of Picotees. 12. To Mr. Turner, of Chalvey, near Windsor, for twenty-four varieties of Carnations. 13. To Messrs. Norman, of Woolwich, for twenty-four varieties of Picotees. 14. To Mr. May, gardener to E. Goodheart, Esq., for Roella ciliata. 15. To Mr. Iveson, gardener to the Duchess Dowager of Northumberland, F.H.S., for Curcuma Roscoeana. 16. To Messrs. Veitch, for Fuchsia serratifolia. 17. To Mr. Wood, of Norwood, for a collection of Hardy Dwarf Herbaceous Plants. 18. To Mr. Taylor, gardener to J. Coster, Esq., for a col-

lection of Hardy Ferns. 19. To Messrs. Rollisson, for Ixora odoratissima. 20. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for a Queen Pine-apple, weighing 5 lbs. 3 oz. 21. To Mr. Dryden, gardener to W. Evans, Esq., M.P., for an Enville Pine-apple, weighing 6 lbs. 5 oz. 22. To Mr. Mitchell, gardener to the Earl of Ellesmere, Worsley Hall, Manchester, for a Providence Pine-apple, weighing 11 lbs. ¼ oz. 23. To Messrs. Garraway and Co., Bristol, for the same, weighing 9 lbs. 8¼ oz. 24. To Mr. Lushey, gardener to J. Hill, Esq., Streatham, for Black Prince Grapes. 25. To Mr. Riddell, gardener to F. Ashby, Esq., Staines, for Dutch Sweetwater Grapes. 26. To Mr. Cox, gardener to M. Ricardo, Esq., Kiddington House, Oxon, for Cannon Hall Muscat Grapes.

Silver Knightian Medals: 1. To Mr. Francis, Hertford, for a collection of cut Roses, in fifty varieties. 2. To Mr. Terry, gardener to Lady Puller, for the same, in twenty-five varieties. 3. To Mr. Bruce, gardener to Boyd Miller, Esq., for Erica Parmentieri. 4. To Messrs. Jackson and Son, Kingston-on-Thames, for Erica Massoni major. 5. To Mr. Elliott, gardener to J. B. Boothby, Esq., F.H.S., for Oncidium pulverulentum. 6. To Mr. Kemp, gardener to Mrs. Grillion, East Acton, for six species of Achimenes. 7. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for a collection of Hardy Ferns. 8. To J. W. Newhall, Esq., Woolwich, for twenty-four varieties of Carnations. 9. To Messrs. Norman, for the same. 10. To J. W. Newhall, Esq., for twenty-four varieties of Picotees. 11. To Mr. Turner, Chalvey, for the same. 12. To Mr. Bray, gardener to the Baron de Goldsmid, St. John's Lodge, Regent's Park, F.H.S., for six Fuchsias. 13. To M. Linden, Luxembourg, for Alloplectus speciosus. 14. To Mr. Cole, gardener to H. Colyer, Esq., for the best-named collection of Plants (no error in thirty names). 15. To Mr. Jones, gardener to E. J. Hutchins, Esq., Dowlais House, Glamorganshire, for a Queen Pineapple, weighing 4 lbs. ¾ oz. 16. To Mr. Jackson, gardener to H. Beaufoy, Esq., South Lambeth, for a Trinidad Pineapple, weighing 7 lbs. 2 oz. 17. To Mr. Christie, gardener to Viscount Folkestone, for a Providence Pineapple, weighing 10 lbs. 7½ oz. 18. To Mr. Cole, gardener to H. Colyer, Esq., for Grapes in pots. 19. To Mr. Ogle, gardener to the Earl of Abergavenny, for the heaviest bunch of Grapes exhibited (Black Hamburgh, weighing 3 lbs. 12 oz.) 20. To Mr. Hyde, gardener to G. Willis, Esq., Oak-Hall, Wanstead, for Black Hamburgh Grapes. 21. To Mr. Rust, gardener to J. MacLaren, Esq.,

F.H.S., for Muscat of Alexandria Grapes. 22. To Mr. Gadd, of Betchworth Castle, for White Frontignan Grapes. 23. To Mr. Butcher, gardener to W. Leaf, Esq., F.H.S., for Grapes, seedling from Black Hamburgh. 24. To Mr. Wright, gardener to the Hon. Miss Rushout, Wanstead Grove, Essex, for Royal George Peaches. 25. To the same, for Violet Hative Nectarines. 26. To Mr. McEwen, gardener to Colonel Wyndham, F.H.S., for the heaviest Melon exhibited (Windsor Prize, weighing 8 lbs. 14 oz.). 27. To Mr. Gadd, for the heaviest Melon exhibited in the Market Gardeners' Class (Cantaloupe, weighing 5 lbs.). 28. To Mr. Jones, gardener to E. J. Hutchins, Esq., for the best-flavoured Melon exhibited (Greenfleshed).

Silver Banksian Medals: 1. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for a collection of ten Stove and Greenhouse Plants. 2. To Mr. Ellis, Woolwich, for twenty-four varieties of Carnations. 3. To Mr. Ward, for the same. 4. To Mr. Ellis, for twenty-four varieties of Picotees. 5. To Mr. Ward, for the same. 6. To Mr. Iveson, gardener to the Dowager Duchess of Northumberland, F.H.S., for Oncidium guttatum. 7. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for Hothouse Ferns. 8. To Mr. Wood, of Norwood, for ten Hardy Ferns. 9. To Mr. Gerrie, gardener to Sir J. Cathcart, Bart., F.H.S., for Erica Cavendishii. 10. To Messrs. Pamplin, for Erica ampullacea. 11. To M. Linden, for Maranta albo-lineata. 12. To Messrs. Rollisson, for a species of Capparis, from Java. 13. To Mr. Cooper, gardener to Jas. Gadesden, Esq., F.H.S., for Lisianthus Russellianus. 14. To Mr. Hamp, gardener to J. Thorne, Esq., South Lambeth, for Stigmaphyllon aristatum. 15. To Mr. Ray, gardener to J. J. Blandy, Esq., F.H.S., for the second best-named collection of Plants (no error in twenty names). 16. To Mr. Hewitt, gardener to J. Purday, Esq., Queen's-Row, Bayswater, for a Queen Pineapple, weighing 3 lbs. 12½ oz. 17. To Mr. Elphinstone, gardener to the Right Hon. the Speaker, F.H.S., for a Trinidad Pineapple, weighing 5 lbs. 12 oz. 18. To Mr. Hamp, for a Providence Pineapple, weighing 7 lbs. 4½ oz. 19. To Mr. Jackson, gardener to H. Beaufoy, Esq., South Lambeth, for Black Hamburgh Grapes. 20. To Mr. Chapman, the same place, for the same. 21. To Mr. Taylor, gardener to J. Coster, Esq., for White Muscadine Grapes. 22. To Mr. Kemp, gardener to Mrs. Grillion, for Muscat of Alexandria Grapes. 23. To Mr. Hewitt, for Grizzly Frontignan Grapes. 24. To Mr. Elphinstone, for Victoria Grapes. 25. To Mr.

Snow, gardener to Earl de Grey, F.H.S., for Violet Hative Peaches. 26. To Mr. Graham, gardener to Mr. Smith, Bersted Lodge, Bognor, for Nectarines. 27. To Mr. M'Ewen, gardener to Col. Wyndham, F.H.S., for Brown Turkey Figs. 28. To Mr. Busby, gardener to S. Crawley, Esq., Stockwood Park, Luton, for Black Eagle Cherries. 29. To Mr. Lydiard, of Bath, for Strawberries. 30. To Mr. M'Ewen, for the second best-flavoured Melon (Lord Montague's Scarlet-fleshed).

Certificates of Merit: 1. To Mr. Hale, gardener to Mrs. Davies, Clapham Park, for Erica ampullacea major. 2. To W. H. Story, Esq., F.H.S., for a seedling Erica, "Nobilis." 3. To Mr. Iveson, for Hothouse Ferns. 4. To Mr. Jack, for a variety of Erica Shannoni. 5. To Messrs. Veitch, for Chætogastra strigosa. 6. To Mr. Gaines, F.H.S., for a Fancy Pelargonium, "Shylock." 7. To Messrs. Rollisson, for the third best-named collection of Plants (no error in fifteen names). 8. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for Bellegarde Peaches. 9. To Mr. Foggo, gardener to the Marquis of Abercorn, F.H.S., for Murray Nectarines. 10. To the same, for White Marseilles Figs. 11. To Mr. Snow, for Florence Cherries. 12. To Mr. Joynes, gardener to Mrs. Hall, Totteridge, for Passingham Melons.

August 1, 1848. (REGENT STREET.)

ELECTIONS. Sir C. Morgan, Bart., 32, Portman Square; the Rev. Henry Glossop, Vicarage, Isleworth; W. Strachan, Esq., 15, Regent Street; E. L. Betts, Esq., 29, Tavistock Square; W. Brice, Esq., Clifton, near Bristol; and T. Baring, Esq., M.P., Charles Street, Berkeley Square.

AWARDS. *Silver Knightian Medals:* To Messrs. Rollisson, of Tooting, for a mass of Miltonia spectabilis in a shallow tub 3 feet in diameter, covered with blossoms over the whole surface. To Mr. Ingram, of the Royal Gardens, Frogmore, for a very fine Providence Pine Apple weighing 11 lbs. 5 oz.

Banksian Medals: To Mr. Bray, gardener to E. Lousada, Esq., Peak House, Sidmouth, Devon, for a fine specimen of the same variety of Pineapple weighing 10 lbs.; with this was also another Providence weighing 7 lbs. 3 oz. To Mr. Wilmot, of Isleworth, for a smooth-leaved Cayenne Pine weighing 7 lbs. 9 oz., being the best of three fruits, the other two weighing respectively 5 lbs. 9 oz. and 3 lbs. 13 oz.

Certificates of Merit: To Messrs. Lane and Son, of Great

Berkhampstead, for a rose-coloured Achimenes named Kleei, a variety in the way of grandiflora; the same collection also supplied two large flowered varieties of A. longiflora, and a collection of Hollyhocks.

MISCELLANEOUS SUBJECTS OF EXHIBITION. A small collection of Orchids from Mr. Beck, of Isleworth; a well-cultivated specimen of Scutellaria Ventenatii, profusely ornamented with spikes of rich crimson blossoms, from Messrs. Rollisson; a nice specimen of Allamanda cathartica, from Mr. M'Ewen, gardener to Col. Wyndham, of Petworth; the Heliotrope called Triomphe de Liège, from Mr. Turner, of Chalvey; a Java Ixora, and an indifferently flowered specimen of the beautiful Disa grandiflora, a terrestrial Orchid found on the Table Mountain behind Cape Town, from Messrs. Veitch, of Exeter; and clean and healthy flowering specimens of Fuchsia serratifolia and Alice Maude, from Mr. Wrench, of London Bridge. "The Fuchsia serratifolia," Mr. Wrench stated, "was reared from a small plant in a conservatory at the top of our warehouse near London Bridge, where are numerous varieties of Fuchsias raised from slips, and which, with Brachycomes, Phloxes, Primulas, Mignonette, and Tropæolum canariense raised from seed, have kept the house quite gay with abundant blossoms. We understand that nurserymen find the Fuchsia serratifolia a shy bloomer, but we think that our specimen grown with ordinary care on a *house-top in the heart of the metropolis* proves the contrary. Fuchsia (Alice Maude) is sent merely to show how strongly plants will grow with us, many sorts having been much better than this. These plants are exhibited, not so much as specimens of good cultivation as to show what with a little care and common sense can be done in a London atmosphere, and to induce others, especially in the fashionable districts, to attempt on a larger scale what is so generally considered impracticable—the delights of horticulture and the pleasures of a greenhouse mid the dulness and gloom of a town. The house in which these were grown was built merely to try the growth of seeds, and in winter it is warmed by hot water from one of Stephenson's little boilers; it is 12 feet long, 9 feet wide, and about 8 feet high in the centre. We had a splendid show of Hyacinths and other bulbs, and Pelargoniums, Roses, &c. have flowered well with us. From judicious syringing and fumigation we have been able for the most part to keep down the green fly and other insects." Mr. Chapman, gardener to J. B. Glegg, Esq., F.H.S., sent a Persian Melon weighing 6 lbs. 12 oz., and two fair bunches of well-coloured

Black Hamburgh Grapes, with which came the following memoranda :—" Finding the vines in this establishment in a bad condition, I was at a loss to discover by what means to furnish my employer's table with grapes. I thought that to destroy all the vines at once would be unwise, and on examining the border I found it very wet and cold. I cut a trench 3 feet from the front of the house across the border, and found all the old roots decayed, and only some few new ones growing from the stems of the vines, and which had the appearance of having been produced after the manure had been removed. In November, 1846, I filled the trench with hot stable manure and covered the border with 3 feet of oak leaves. Forcing commenced on the 21st of November. The vines broke weakly, and showed a light crop which ripened in April. After the crop was all cut, I shaded the house and removed the other portion of the border, taking every particle of soil away, although the vines were in full leaf, I drained it well with strong oak wood, and upon this was put 1 foot in thickness of long manure in a fresh state. The soil employed was turfy loam and horse droppings; the roots were carefully placed in the soil as we made the border. After all was finished, it received a gentle watering, and in a fortnight the vines commenced growing, and made shoots up to the top of the house, and ripened in October. The vines were pruned in November. Forcing commenced on February 8th, and there is now a good crop of grapes, of which the specimens sent are samples. The vines have all made shoots of good strength from the bottom to the top of the house, and have all the appearance of luxuriance, their leaves being large and dark green, and I have no doubt they will bear fruit of excellent quality next year. They are now in a good state for early forcing, the wood being quite ripe. The three bunches I sent to Chiswick July meeting, weighing 2 lbs. each, from the same vines were not sent with the view of obtaining a prize, but merely as evidence of the hardships the vine will bear, and of a quick way of improving vines when they are in a bad condition." Samples, green and white, of a very nice sort of elastic hexagon netting were shown by Mr. Haythorn, of Nottingham.

Novelties from the Society's Garden. Tritonia aurea, a beautiful orange-flowered Caffreland production, nearly related to Gladiolus; Eranthemum albiflorum, an Acanthad, pretty enough, but too much like a white Lilac; Calceolaria cuneiformis, a woody Bolivian species, in its young state

too leafy in proportion to the number of its small clear, yellow blossoms, which were in this instance produced but sparingly; Zauschneria californica, a brilliant red-flowered Onagrad, which will probably prove a good bedding plant; and another new Californian introduction in the shape of Abronia umbellata, a trailing coast-plant with small pale purple flowers, which are fragrant.

Books Presented.

The Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. IX. No. 18. From the Society.

Meteorological Observations made at Madras in the years 1841, 42, 43, 44, and 45, in 5 vols. From the Honourable the Court of Directors of the East India Company.

Die Vegetationsorgane der Palmen, ein Beitrag zur vergleichenden Anatomie und Physiologie von Hermann Karsten. From the Author.

The Athenæum for July. From the Editor.